

THE IRON AGE

THURSDAY, NOVEMBER 13, 1902.

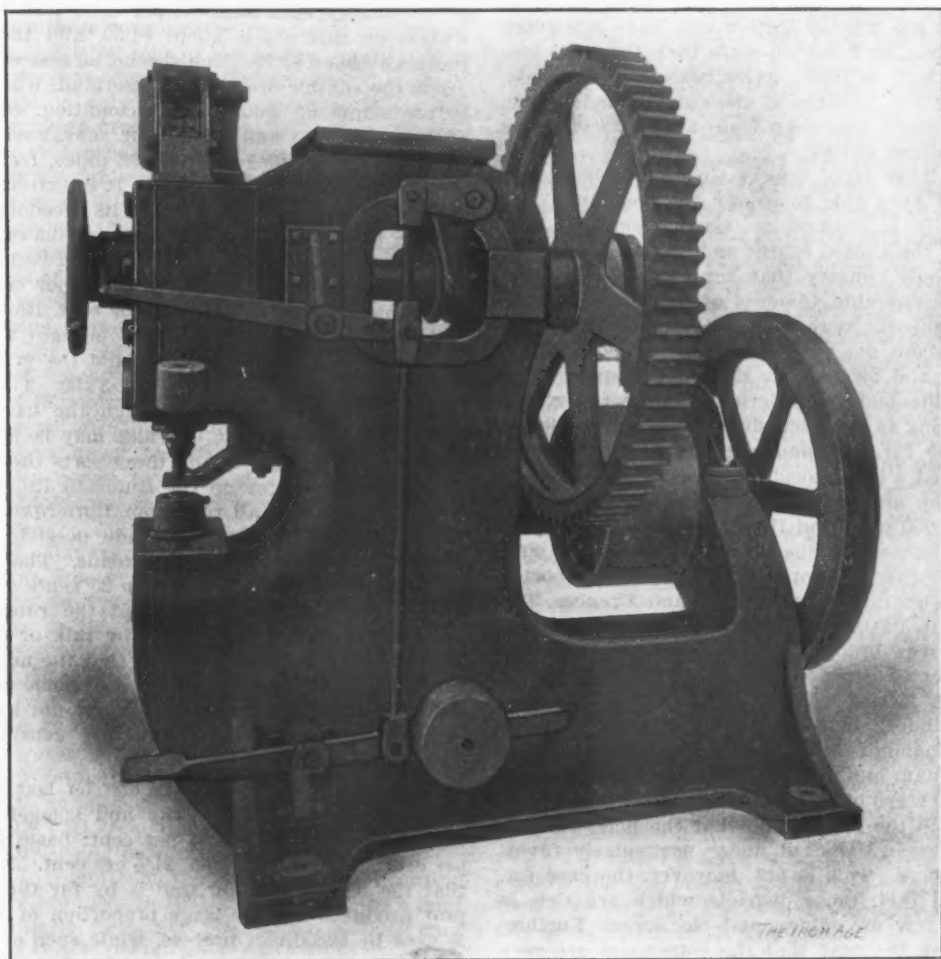
The New Doty Punch and Shear.

One of the leading features of the punch here illustrated is that the driving shafts are so constructed as to permit of their removal without disturbing the gearing. The machine is provided with an automatic stop, which brings the sliding head to rest at any desired point of the stroke. The eccentric shafts are of hammered steel, and the sliding heads are counterbalanced. The change from punch to shear, or *vice versa*, can be quickly and easily made. In handling certain classes of work it is desirable to use a radial crane in connection with the punch or shear. In this machine, which is built by the New Doty Mfg. Company of Janesville, Wis., care has

been exercised to facilitate such an attachment. This punch may be either steam or electrically driven.

rious States has, to a large extent, already appeared in our columns at different times. It would be premature, and indeed unnecessary, to give further detail pending the adoption or rejection of the bonus bill. If, as is more than likely, the bill is finally adopted, free of restrictions regarding State established works, capital is already available for the establishment of local works, either by William Sandford, Limited, or the Blythe River Iron Company, and it will then be time to consider the probable effect of the bonus on the sale of American manufactured iron in Australia.

Negotiations aiming at the establishment of an Austro-Hungarian iron cartel are making satisfactory prog-



THE NEW DOTY PUNCH AND SHEAR.

been exercised to facilitate such an attachment. This punch may be either steam or electrically driven.

The Australian Iron Industry.—In the issue for August 21 attention was drawn to the development brought about chiefly by the action of the labor party in the local House of Representatives, in demanding that no bonus shall be paid on the manufacture of iron from local ores unless the industry is run by one of the States. We are advised by our special correspondent that the whole matter is still in *statu quo*, and a select committee (dearly beloved of the Australian politician) has been formed and is now inquiring into the question. The Government geologists and mining inspectors in the various States were being examined when the mail left. Their evidence regarding deposits of iron ore in the va-

ress, and this will come into force with the settlement of the nature of union between the under syndicates. The wire and wire nail manufacturers have concluded their respective unions, so that only those of the fine sheet and tube makers remain.

It is reported from St. Petersburg that in order to assist the metal industry enormous orders will be placed by the Russian Government during the next year for railway material. These will include no fewer than 1670 locomotives, 22,000 cars and over 300,000 tons of steel rails, the total value attaining about \$70,000,000. When it is remembered that in the first half of the current year the Government distributed orders amounting to about \$40,000,000 to the metal industry, the nature of its efforts to stimulate development of Russian industries will be better appreciated.

Germany's Progress in the Manufacture of Pig Iron Since 1880.

On account of Düsseldorf's Industrial Exposition, the British Iron and Steel Institute held their autumn meeting this year in that city for the first time since 1880. W. Bruegmann presented an article with above title, from which we take the following facts:

The two principal causes of Germany's progress in pig iron manufacture were the development of the collieries, which made it possible to provide the furnaces with domestic fuel, and of the iron ore beds of Luxemburg and Alsace-Lorraine, the latter being made possible by the introduction of the basic process. The amount of coal mined was 47,000,000 tons in 1880 and over 100,000,000 in 1900, the greatest increase being shown by the district of the Ruhr—that is to say, Westphalia and the Rhine Provinces. This district produces enough coke to supply, if necessary, every blast furnace in Germany.

The most important factor, however, in this large increase was the introduction of the basic process. Although the importance of this was realized in 1880, nobody at that time thought that the production of basic Bessemer pig iron in 1890 would have amounted to 4.8 million tons, or 2,000,000 more than the total production of pig iron in 1880. After basic Bessemer pig, the most important increase is shown in foundry iron, the output of which has risen from about 200,000 tons in 1880 to 1.5 million in 1900.

In spite of these large figures Germany's blast furnaces have not been able to supply the demand. The two countries in a position to smelt domestic ores exclusively are the United States and Germany, and the former is the only country that actually does so, Germany using considerable amounts of foreign ore, while Great Britain imports more than one-third of all the ore used, France about one-half and Belgium about seven-eighths. Spain and Sweden are the two countries chiefly supplying this material. Germany's imports exceed her exports owing to the necessity of making a suitable mixture for the furnaces and also for the reason that some works need a low phosphorus ore for making Bessemer iron. The amount of ore mined in Germany in 1880 was 7,000,000 tons, and this grew, owing chiefly to the rapid development of the Minette mines, to 19,000,000 in 1900. Of this amount 3.25 million were exported in about equal quantities to Belgium and France. The imports of ore in 1900 amounted to 4.1 million, of which about 500,000 was brought by rail, about one-half of which came from Austria for the Silesian iron industry, while the other 250,000 consisted principally of purple ore and mill cinder, divided between Belgium, France, Holland and England. Most of the imported ore comes through Rotterdam and Amsterdam.

The rapid increase in the production of pig iron would naturally lead to the supposition that the blast furnace industry in Germany worked under particularly favorable circumstances. This is not, however, the case for, as a matter of fact, those districts which are rich in fuel have but few ore mines, and *vice versa*. Furthermore, it is often the case that the consumers are very far away from the point of production, as will be seen more completely by a consideration of the distribution of the industry.

The Empire may be divided into seven principal districts, as far as iron making is concerned, as follows:

	Proportion of total production.
1. Rhineland and Westphalia (excepting the Saar district and Siegerland).....	38.7
2. Siegerland, Lahn district and Hesse Nassau.....	8.1
3. Silesia and Pomerania.....	9.8
4. Kingdom of Saxony.....	0.3
5. Hanover and Brunswick.....	4.4
6. Bavaria, Wurttemberg and Thuringia.....	1.5
7. Saar district, Lorraine and Luxemburg.....	37.2
	100.0

The production of Rhineland and Westphalia (group No. 1) rests principally on the huge coal deposits of the Ruhr basin, and this wealth of fuel also gives the district its leading place in the industries of which pig iron is the basis. With one exception the blast furnaces in

this district use coke for fuel. This coke, in spite of the fact that it is made from coal of many different varieties and of varying grades of purity, may be described as a very good blast furnace coke. The percentage of ash is about 9 per cent.; of water, 7 to 12 per cent., and, with regard to its physical strength, it may be remarked that experience has shown that 100-foot furnaces can successfully use it. Most of the furnaces possess their own coke plants, but these do not, as formerly, provide all the fuel needed, as the coal operators have so fixed the prices of coking coal that there is little profit left for the coke works. By purchasing their own mines the larger iron works have made themselves independent of the coal market. Generally the mines are in the immediate neighborhood of the furnaces, and where this is not the case they are connected by private railroads.

With regard to the ore supply practically everything comes from outside the district. In 1900 2.36 million tons of domestic ores and cinder and 3.06 million of foreign ores were used. Of the domestic ores the greater part was Minette, and on account of the great distance (206 miles) and consequent high freight rates, only the better quality with 32 to 38 per cent. iron is used. The freight on this ore is about \$1.50, and the price f.o.b. furnaces about \$2.75. The second largest source of supply is the spathic ore of the Siegerland, which is roasted before shipment, and, in that condition, contains 47 to 48 per cent. iron and 8 per cent. manganese. This ore is brought a distance of about 93 miles, freight being 75 cents a ton and the price \$4.50. It is extremely valuable for steel making on account of its freedom from phosphorus and its high percentage of manganese. The districts of the Lahn and Dill supply two kinds of ore—namely, red hematite, with 48 to 52 per cent. iron, and manganese ore, with 22 to 38 per cent. iron and 7 to 24 per cent. manganese. They are brought a distance of 136 miles, the freight being \$1 and the price for hematite \$3.90 and for manganese ore \$3.60. The foreign ore comes almost exclusively through the harbors of Rotterdam and Amsterdam, to which may be added in quite recent times Emden. From these ports the ore is cheaply brought in barges up the Rhine to Ruhrort, or some other port, or else all rail from Rotterdam. The latter means of transportation is made possible by the low freight rates on the Dutch railroads. The freight from the ocean ports is not more than 25 cents a ton to Duisburg or Ruhrort. To Dortmund the rates amount to about 90 cents, either entirely by rail, or part rail and part water. It is very probable that the new Dortmund-Ems canal will cause a diversion of some of this traffic, but at present the arrangements are not by any means complete and the freight rates are considerably more than those via the Rhine.

The pig iron made in this district last year was divided as follows: Forge iron and spiegeleisen, 10 per cent.; Bessemer iron, 11½ per cent.; basic Bessemer, 57 per cent., and foundry iron, 21½ per cent. It will be seen that the basic Bessemer iron is by far the most important product. A very large proportion of this material is used by the direct process, while such of it as is produced for sale shows about the following analysis: Silicon, 1 per cent. or under; phosphorus, 1.8 per cent. or over, and manganese, 2 per cent. or over. The ore mixture is about as follows: 35 to 40 per cent. Minette; 35 to 40 per cent. Swedish, 10 per cent. spathic or Nassau brown ore and 10 to 20 per cent. various materials. The foundry iron is mostly made by works on the Rhine, as they are conveniently situated for cheaply handling foreign ore, which is the chief material used in its production. In this district Bessemer iron is made only by Krupp and the Bochumer Verein, all other works using the basic process. Open hearth steel is largely made, almost all of the works which have converters being in possession also of one or more furnaces for working up the scrap. As a general rule they do not use more than 20 to 25 per cent. pig iron. Large quantities of manganese alloys are made in this district, using for the spiegeleisen domestic ore, while the high manganese alloys are made from ore from all parts of the world.

The second group of blast furnaces, comprising those of Siegerland, the Lahn district and Hesse Nassau, use

almost exclusively domestic ore. The production of 1901 was divided as follows: Forge iron and spiegeleisen, 70.3 per cent.; Bessemer, 3.7 per cent.; basic Bessemer, 2.1 per cent. and foundry iron, 23.8 per cent. Siegerland has a world wide reputation for its spiegeleisen, which is made partly from domestic and partly from foreign ores and of about the following composition: Manganese, 6 to 30 per cent.; carbon, 4 to 5 per cent.; copper, 0.2 to 0.3 per cent.; silicon, 0.3 to 0.5 per cent. For export the percentage of manganese is kept at about 20 per cent. The annual production of ore in Siegerland amounts to over 1.5 million tons, of which two-thirds is used in this district. For fuel it is dependent upon coke from the Ruhr, on which an average freight of about \$1 is paid. One furnace still uses charcoal for fuel. There are two works in Nassau which make foundry iron from the local red hematite.

Group No. 3, comprising the works of Silesia and Pomerania, made in 1901 about 750,000 tons divided as follows: Forge iron and spiegeleisen, 46 per cent.; basic Bessemer iron, 25 per cent.; foundry iron, 24 per cent., and Bessemer, 5 per cent. It is remarkable that in this group there has been an increase in the production of forge iron and spiegeleisen since 1880. The principal seat of the Silesian iron making industry is the coal district in the southern part of the province, which produced in 1900 25,000,000 tons of coal. The supply of coking coal is, however, decidedly limited, and the manufacture of coke is only possible by means of the improved coal washing arrangements. Even then the coke is inferior to that produced in Westphalia. Upper Silesia is also unfavorably situated as regards its ore supply. There are certainly large quantities of brown hematite, which contain, however, only 26 to 32 per cent. of iron with about 0.2 per cent. of phosphorus, but the large quantities of lead and zinc have a very unfavorable effect on the working of the furnaces. Besides the domestic ores, cinder and the residue of pyrites, spathic ore from Hungary, clay ores from Poland, magnetite, blackbrand and Swedish ores are used.

Group No. 4 (Kingdom of Saxony) consists of a single works, producing 20,000 tons of pig iron and using spathic and brown hematite ores from the neighborhood. The fuel mostly comes from the district in which the works are situated and the iron is used in basic open hearth furnaces.

Group No. 5 (Hanover and Brunswick) consists mainly of two works, one at Ilsede and one at Osnabrueck. The former makes basic Bessemer iron from its own ores and works up the material at mills in Peine. The coal and coke come from Westphalia, the freight for coke being \$1.60. The Osnabrueck works make about 100,000 tons a year of various grades, chiefly from local ores and with coke from Westphalia. To this group also belong a few works in the Hartz Mountains, which use local ores and Westphalian coke.

Group No. 6, comprising the works of Wurtemberg, &c., also gets its fuel from Westphalia, paying a freight of \$2.50 to \$3 and using local ores.

Group No. 7, comprising the Saar District, Lorraine and Luxemburg, produced in 1901 half of Germany's total production of basic Bessemer pig, while in 1883 only 183,000 tons of this material were made. The large deposits of Minette in Luxemburg and Lorraine are the foundation of the industries in this district. These deposits in Lorraine are estimated at 3,200,000,000 tons, which would be enough, at the present rate of work, to last 800 years. In 1901 Alsace Lorraine mined 7.5 million tons of ore, of which 4.2 million were used locally, 1.34 million went to the Saar District, 0.93 to Rhineland and Westphalia, 0.44 to France, 0.49 to Luxemburg and a small amount to Belgium. The cost of mining is very low. The greater part of the fuel used comes from Westphalia, while some is brought from Belgium, the freights being from Westphalia to Luxemburg \$1.90, to Lorraine \$1.90 and from Belgium to Luxemburg \$1.10, to Lorraine \$1.30. The basic Bessemer process is used very extensively in this district, all large furnace plants being connected with steel works. The manganese necessary in the basic Bessemer iron is mostly obtained in the western district from foreign ores which come in by way of Antwerp. Quite important in the district is the manufacture of foundry iron, which has a similar composition

to that made in Middlesbrough and is used in most of the German foundries.

The works in the Saar District are rather differently situated to those in Luxemburg and Lorraine, as the furnaces are dependent upon the railroads for their supply of Minette, only a small quantity being transported by means of the Saar Canal to the works situated on its banks. Coking coal is obtained from mines situated in the district, and the quality is said to be equal to that of Westphalia. Here also the most important furnaces are combined with steel works. Greatly desired by these works and also by those on the Rhine is the slackwatering of the Moselle River, which would enable them to obtain their supply of ore much more cheaply.

Germany's Pig Iron Production from a Technical Point of View.

In an article read before the meeting of the Iron and Steel Institute at Düsseldorf in 1880 the following sentence appears: "Although the German works are endeavoring to adopt all modern improvements, there is nothing remarkable in their arrangements." To-day Germany possesses quite a long list of blast furnaces which in their arrangements are in no way behind foreign works. For these the American works have been taken as examples, although there can be no question of a blind copying.

Before speaking of blast furnaces themselves, a few words may be devoted to the progress made in the manufacture of coke. The chief points desired in coke are a low percentage of ash and high physical strength. The introduction of coal washeries has made it possible to make coke with a very low percentage of ash, but by this process a large amount of coal is lost and blast furnacemen are now convinced that strength is more important than the percentage of ash, and they are satisfied with a coke containing 8 to 9 per cent. ash. To produce a firm coke a mixture of noncoking and coking coal is used, the percentage of each being strictly regulated, and the same is then compressed in the oven mechanically. The most important point, however, is to have coke ovens which work at a high temperature. In Germany Coppee ovens are mostly used with a small chamber and not too high.

The progress which Germany has made in the improvement of its blast furnaces is best shown by the fact that the number of workmen employed has only grown from 22,00 in 1880 to 35,000 in 1900, in spite of the fact that the tonnage has been tripled. The chief improvements have been made in the arrangements for handling the raw material and pig iron. More especially is this the case at works in the coal district which use foreign ores and which must be so arranged that they can handle the contents of several steamers within a few days. Unloading arrangements of the American type (Hunt and Brown) are used for transferring the ore from ships to the ore yard. Ropeways are used at almost every works for getting the coke and ore to the top of the furnaces and also for removing the granulated slag. The direct process is used wherever the conditions permit, and pig mixers holding up to 250 tons are also used very largely. Pig casting machines are not used to any great extent in Germany.

The exterior of the blast furnace has also changed very much in recent years, a lighter construction being used than was formerly the case. The dimensions of the more recently constructed blast furnaces, both in the coal and the Minette districts, vary from 72 to 82 feet in height, from 13 to 16½ feet in diameter at the top, 19 to 23 feet in diameter at the bosh and 11½ to 15 feet diameter of hearth.

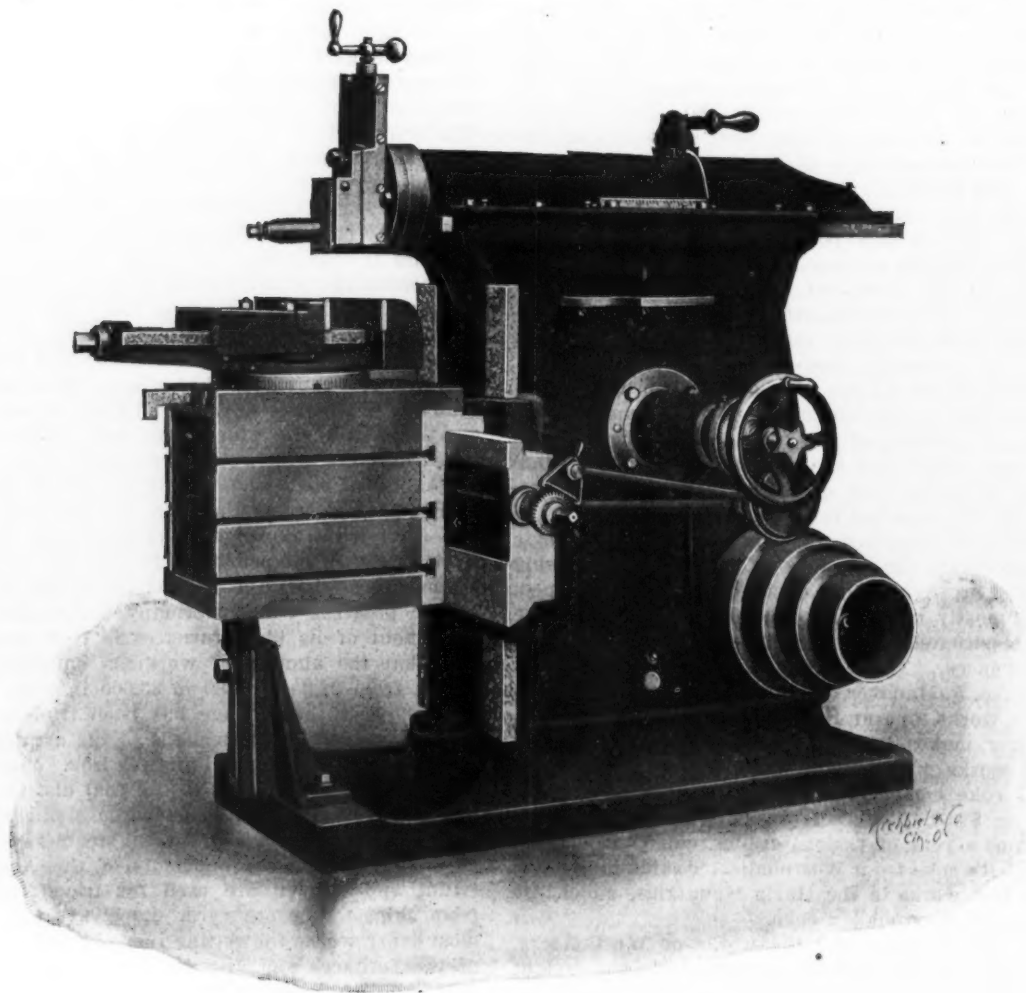
Great progress has been made in recent years in washing the furnace gas, due principally to the introduction of the gas engines. In addition to the well-known older arrangements and apparatus, those used in gas works have been taken as a model and centrifugal cleansers are extensively used. It is accepted as a fact to-day that a sufficiently complete cleansing of the gas and drying of the same is quite feasible without using an extravagant amount of water.

For the production of the hot blast, Cowper stoves of 19 to 23 feet in diameter and 65 to 100 feet in height are used. Many improvements have also been made in the construction of blowing engines. Corresponding to

the more general use of the compound system, steam pressures have been considerably increased. At the present date sometimes as high as 240 to 300 pounds are used. The Cornwall boiler is still the most used, although the improvements in the cleaning of the gas make more complicated systems possible, such as water tube boilers with mechanical flue cleaners. In spite of the great improvements, which have taken place in steam engines in recent years, they are likely to have a hard fight against gas engines. Almost all the German furnaces use larger or smaller gas engines, Hoerde and Differdingen being the first to use them on a large scale. Hoerde has three engines, each 600 horse-power, and one of 1000 horse-power, all used for the production of electricity, and Differdingen has nine engines, each of 600 horse-power, of which three are used for driving blowing cylinders. Gas engines, using furnace gas, are stated to show a very high degree of economy, especially when

The New American Crank Shaper and Motor Driven Lathe.

The crank shaper shown on this page is the latest product of the American Tool Works Company of Cincinnati and is much heavier and stronger in every way than former models. The column is of unusual depth and width, tapering slightly from base to top, adding to the solidity as well as the graceful appearance of the machine. The base is of the extension type. The ram has long, wide bearings in the column and is furnished with improved oiling facilities. The table, cross rail and other parts have all been given additional dimensions and weight, thus making the machine as a whole of greatly increased power and capacity. The stroke is positive and the length may be changed at will without stopping the machine. The index shown



THE NEW AMERICAN CRANK SHAPER.

they are worked up to their full power. Quite a little power is used in the washing of the gas. As far as original cost is concerned, gas engines with a gas washing plant are said to cost about the same as steam engines and boilers. In many works the superfluous power is used in the manufacture of cement from blast furnace slag, or else this material, which is universally granulated, is sold either as sand or is made into bricks.

The average daily production of German blast furnaces may be placed at 200 tons; in the Minette District a little lower and in the coal district higher. In some cases the production is very much larger. The works "Deutscher Kaiser" state that in 1902 the greatest daily output for one furnace was 518 tons and for four furnaces 1661 tons when working with a burden containing 42 per cent. iron. The amount of labor used varies in very wide limits, but the following figures for two works may be given here:

	Production		Tons.
	Tons.	Workmen.	per man.
Deutscher Kaiser (six months)	208,651	980	419
Hoerde	255,720	685	373

on the ram facilitates the setting of the stroke to the length desired. The rocker arm is pivoted near the base line, and this gives the ram an almost uniform rate of speed its entire stroke and provides an exceedingly quick return. The back gear ratio is the highest employed on any shaper and gives this tool an exceptional power in taking heavy cuts. The rocker arm is of double section pattern, permitting large sized shaft to be passed under the ram and through the hole shown in the top of the column, for key seating. This shaper is made in sizes embracing 16-inch single geared and 16, 18, 21 and 25-inch back geared.

American Motor Driven Engine Lathe.

The second engraving represents a 24-inch electrically driven engine lathe built by the same company. The lathe itself is the regular standard tool made by this company. The motor is of the double commutator type, 3 horse-power, and is mounted on a saddle on the head, with communication direct to the spindle by a raw hide pinion and intermediate slip gear. The controlling apparatus for starting, stopping and reversing is simply and

conveniently arranged at the right end of carriage. There are four fundamental speeds obtainable from the motor itself through the speed controller directly under the head. This, with the spindle gearing, gives a total of 16 distinct and positive spindle speeds available. The efficiency of the motor is practically constant at all speeds. The motor reverses at the same speed as when going forward.

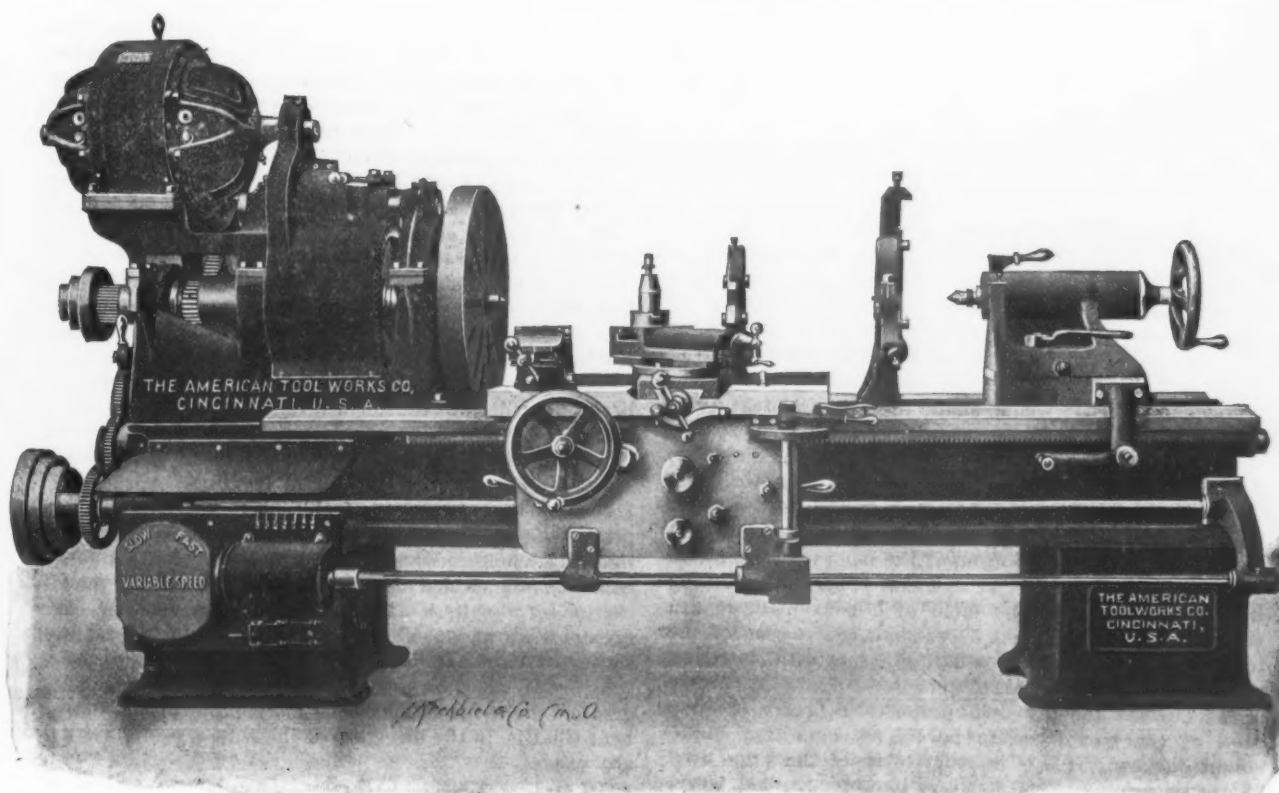
The Knoth Steel Process.

Henry Knoth of Birmingham, Ala., has invented and patented a new continuous process for manufacturing open hearth steel. Mr. Knoth is a practical steel maker of many years' experience in acid and basic Bessemer and open hearth processes, having practiced all methods in Germany and in the United States. For a year he has been in the employ of the Republic Iron & Steel Company and is now in charge of their steel furnace at the Birmingham rolling mills.

the preferable manner is to pour the entire contents of the furnace into the ladle in the usual way, from which about two-thirds is poured into the molds, then the ladle, with the remaining molten steel therein, is run to a heating furnace, located opposite to or near the molds for convenience, which contains the molten pig metal. From this furnace a quantity of molten pig metal sufficient with the steel already in the ladle to make a furnace charge, is tapped into the ladle and its impurities diluted by mixture with the refined metal, then the ladle is run back to the furnace and its partially refined contents poured therein to constitute a succeeding charge.

The process will save time, because it is not necessary to charge and heat cold stock, and will reduce expenses by saving the wages paid to the stockers and yardmen who were required to handle scrap and pig by the old process. It is also claimed that it will give a greater uniformity of product because the melter works with metal of known composition.

Another advantage claimed for the new process, and



NEW AMERICAN MOTOR DRIVEN ENGINE LATHE.

It is said that Mr. Knoth's process will not only increase the output of the present open hearth furnaces more than 100 per cent., but that by dispensing with the use of scrap metal in the manufacture of open hearth steel it will relieve manufacturers from the present scarcity and high prices of scrap and also from the possibility of a scrap famine.

By this process molten steel reserved from a previous heat is charged as a substitute for scrap. Thus instead of dumping scrap and pig metal, both cold, into the furnace as is done under the present processes, about one-third of the steel from a furnace heat is reserved in the ladle into which it was tapped after the greater part of the heat has been poured into the molds as usual. This reserve of molten steel in the ladle is charged back into the furnace from which it was poured, after this has been repaired, and is ready for the succeeding heat.

The pig metal used in this process is always charged in a molten condition, so that nothing but hot metal goes into the furnace, and the reaction beginning at once, the heat is ready to be tapped in four or five hours.

Mr. Knoth in his patent describes several ways of handling and charging these two molten metals, but

it is one of great importance, is that it can be used in the old furnaces, it being only necessary to provide machinery for charging the molten metals.

New Coal Fields in Belgium.—United States Consul, A. A. Winslow, Liege, writes the State Department that in 1901 he noted the discovery of a new soft coal basin in the province of Luxemburg, north of that city. Since then extensive soundings have been made over a considerable territory. The deposit underlies many square miles of the northern part of Belgium and the southern part of Holland. One of the veins, at a depth of from 1000 to 1500 feet below the surface, is from 15 to 17 feet thick, and of a very fine quality of coal. It is estimated that this new field contains more than 500,000,000 tons of a good grade of coal, and extensive preparations are being made to open up the mines. The Government proposes to enlarge the canals in that part of Belgium, dig new ones, and open new lines of railroads. The working of these mines will be more difficult and expensive than of the other mines of Belgium, because of their depth and the presence of more water; but it is thought this will be more than counterbalanced by the thickness of the veins.

An Automatic Foundry Test for Contraction.

Proposed as a Rational Chill Test for Cast Iron.

BY ASA W. WHITNEY.

Early in December, 1900, when regulating some air furnace practice, I devised and roughly tried a contraction test to give results as promptly as the usual chill test. The size of test piece was, however, too small to serve as an ordinary chill test also. Because of other interests I have had no opportunity to develop this matter in practice, but for a paper for the American Society for Testing Materials, June, 1902, which will appear in their proceedings, I used the following title: "A Quick and Automatic Taper Scale Test, proposed as a Standard Form of Contraction Test for any Cast Substance and of Chill Test of Cast Iron."

My aim was first of all to preserve, in spite of the contraction of the cooling test casting, its continuous contact with the chiller (a heavy iron mold). This is necessary to insure the maximum chilling effect in all cases. Secondly, it was desirable to indicate automatically in a simple way the progression and extent of contraction of such a test piece under such standard conditions of uninterrupted contact.

The principle of the taper scale suggested itself as a means of magnifying the effects of small contractions, and its wedge shape also indicated the cross section of casting and mold to preserve contact with each other by merely freeing the top and bottom of test piece as soon as set. The design and methods of molding the top and bottom of the test piece and the details of the mold were shown at the meeting, but may be here omitted, as any founder would construct a suitable cope and drag when he comprehends the purpose of the casting.

Instead of a flat wedge shape the essential feature of the test piece is that of a frustum of a cone whose bottom diameter is 5 per cent. less than its top diameter. This covers a sufficient range of contraction for most cases. A contraction of 5 per cent. in the top diameter would of course be sufficient to allow the frustum test piece to fall out at the bottom of the mold (as the bottom support is removed as soon as metal is set). By making the vertical height of the mold of a convenient length the whole of it represents 5 per cent. contraction of the top diameter, and even one-half of 1 per cent. is represented by considerable gradation.

As devised for my own purposes I prefer the top area of the test piece to be 25 sq. cm. area (3.875 square inches). This is in order to be of the same area as the cross section of my test bars for chilled work, which are hexagonal in section for gray bar and rectangular in section for chilled bar.

This requires a top diameter of 5.642 cm. A contraction of 5 per cent. would reduce this to 5.360 cm. The bottom of the mold is therefore made of this latter diameter inside, while its top is 5.642 cm. diameter inside. By making the vertical height of the mold between these inside diameters just 10 cm., a linear contraction of 5 per cent. of the top diameter of the test piece allows the top of the test piece to fall through the bottom of the mold. A contraction of 1 per cent. (0.12 inch per foot) allows of a drop of 2cm. vertically down the mold.

To test contraction of gray metal in their size of test piece I propose to use a mold made of graphite or gas carbon instead of iron. The usual range for gray irons cast of this section and mass (with such nonconducting mold) would possibly vary from about 0.5 to 2 per cent., and for totally chilled iron (mold being made of cast iron) from about 1.8 to 2.5 per cent.

To make a test for contraction of cast iron more rapid the phenomenon of chill is necessarily introduced, and it is best, therefore, that the conditions should be such that the maximum chill is obtained for the given composition, mass and temperature. That is, the initial contraction must cause no separation, or insulating air space, between the test piece and the chiller, as this tends to reduce both the total contraction and the chill by a sudden alteration of the cooling conditions. I believe this test will be found to fulfill these requirements.

In the determination of chilling capacity of iron the usual methods are crude. The contraction causes variable time of contact or variable insulating space. In the rough chill tests made on the side of a sand molded pig at blast furnaces the usual excessive heat of the pig and the scale on the chilling block are sources of further error. The Whitney chill cup, introduced into car wheel practice about 1872 and adopted at several blast furnaces, secured much greater accuracy as a means of test for chill over a considerable range of composition. The iron was poured from a hand ladle at a proper temperature into an oblong cup shaped cast iron mold (about 6 x 3 x 1½ inches deep), whose bottom was flat (except for a transverse ridge to facilitate subsequent breaking of the test piece), and whose sides were slightly flared. Uninterrupted contact with the bottom was thus attained. The chilling effect in hard irons, however, was complicated by the effect of the exposure of the top to the air and by cross chilling from the sides. Many experiments have proven the value of maintaining contact with the chiller to obtain maximum chilling effect, and the various forms of "contracting chills" for chilling cast iron wheels are made with this view.

Both the variations of rate of contraction and those of chilling capacity encountered in the range of cast iron depend (other conditions given) upon the chemical composition; but any given change in the composition does not necessarily cause these phenomena to vary together in the same degree or even in the same direction. Taking the range of cast iron, however, as a whole, the capacity for chill and the rate of contraction do in general vary in the same direction, whether owing to composition or to the rate of cooling.

In a very valuable paper, entitled "Contraction and Deformation of Iron Castings in Cooling from the Fluid to the Solid State" (American Society of Mechanical Engineers, December, 1896), Francis Schumann gives a formula by which the contraction of an iron casting may be calculated from that of a test bar of a different cross section but of the same composition. In my paper, entitled, "Transverse Strength of Chilled Car Wheel Metal" (Journal of the Franklin Institute, April, 1897), I showed the advantage of chilling a test bar from opposite sides only, to develop the maximum strength, particularly when under such conditions the iron tested became wholly chilled or white. The strength in the direction of the lines of chill being 90 to 100 per cent. greater than at right angles to that direction, I believe, though, I have not definitely proved it, that the rate of contraction also in such wholly chilled iron is slightly greater in the direction of the more rapid dissipation of heat (that is, in the direction of the chill crystals) than in any other.

Precaution in Casting.

As soon as the test is poured any film of iron remaining in the sand pouring basin is promptly separated from the gate, or the sand is loosened to allow it to settle with the contraction of the test piece. As soon as this begins the sand is removed or allowed to drop out from below the movable iron or carbon bottom, which then drops and allows the contracting test piece to project. To hasten the cooling and to be sure no iron in the gate or vents interferes remove the cope, and by a light rap, in case of chilled iron, break off the projecting gate. When black and sufficiently cool the test piece may be further cooled by a blast of air followed by hot and then cold water. The mold at the same time should be cooled by a fine spray of water and blast of air. With an iron mold and hard iron all this should be done in 10 to 12 minutes from the time the mold was filled. An approximate measure of contraction could be taken before removing the test piece for cooling, but when cooled it should be dropped back into the fairly cool mold for close measurement. The rate of contraction of the top diameter is expressed by one-half the number of centimeters of vertical drop of that diameter or top of frustum. The projection of the piece at the bottom of the mold would of course give slightly less than the correct rate, as it is slightly reduced by the vertical contraction. As this latter (the amount of vertical contraction) is due to the rate of contraction across the chill crystals, it would be interesting and convenient for purposes of study to compare it by microm-

eter measurements with the rate of contraction as determined from any diameter of the mold.

Such a test piece made in a gas carbon or other poor heat conducting mold would be quite gray in fracture in most cases. These test pieces, whether chilled or gray, though short, could then be broken (after nicking and properly supporting the ends) by a sledge blow on a "hard edge," and one-half (or enough of the half to show from center to circumference) be prepared for metallographic examination. This grinding, polishing, etching and observation need not take more than 15 to 20 minutes, whether the sample is wholly or partially gray or chilled.

Either half would be suitable as a sample for determination of specific gravity, and for testing hardness by Professor Turner's sclerometer, or other means, and for determination of strength by Grinnell's method of indentation by a hard steel ball of 10 mm. diameter and reference to tabulation of formulæ.

As to the accuracy of my suggested test of contraction I believe it will be found satisfactory when its promptness and advantages as a chill test, &c., are considered. I should estimate the probable error as not more than plus or minus 0.2 per cent. of the assumed top diameter (or a total range in vertical measurements of 8 mm.). This is equal to plus or minus 0.024 inch per foot, while the usual contraction measurements on a 12-inch length of bar have an error of not more than 0.1 per cent., or say 0.012 inch per foot. But if necessary in this cone test the exact contraction also can be readily obtained by direct micrometer measurements of the test piece and of the chill mold in case the latter alters with use.

I advocate the use of a nonchilling mold, such as gas carbon or graphite, mainly as a step in the process of arriving at the value of the chilling mold and its closer comparison with usual transverse or tensile test bars of the same cross section. There are certain special precautions to be taken in making and treating the cast iron chilling molds before final turning to size in order that heat may have little effect. I believe that I can make them to stand the work and retain their dimensions sufficiently well for several hundred tests of cast iron, and longer for more fusible metals or other substances to which the test may apply. Of course for very soft iron and for other metals a smaller size and a different taper may be better. I figure that as here designed an iron which would show only $\frac{1}{4}$ -inch chill on A. Whitney & Sons' regular chill test block ($1\frac{1}{2} \times 2\frac{1}{2}$ inches), cross section chilled on $1\frac{1}{2}$ inch side, would just chill in this test to the center (= chill $1\frac{1}{4}$ inch nearly), the "relative chilling power" of these tests being calculated as 39.8 to 184.6, or, by metric measure, as 15.6 to 72.75. In other words, the normal factor for chill on the slower test is 21.5 per cent. of that on the new test. By Mr. Schumann's formula I figure that an iron showing 0.125 inch per foot (1.0416 per cent.) contraction in a 1-inch square bar will, at the mean proportional cross section of this casting, if similarly made in sand, contract 0.9417 per cent., or 0.113 inch per foot, and similarly the top diameter would contract 0.9373 per cent. Also, when the top diameter contracts 2 per cent. the hexagon bar of same area of cross section, if similarly chilled, would contract 2.0079 per cent. But if cast as usual in sand the contraction of such hexagon bar is known by experience to be about 0.15 inch per foot, or 1.25 per cent. The difference, say 0.75 per cent., is due to the slower rate of cooling in sand. That is, a normal factor by which the contraction rate of the hexagon bar would be calculated is 62.5 per cent. Examination of the microstructures shows in similar cases the cause of the lesser contraction to be the greater decomposition of the cementite in the mass cooling the slower. That is, the Fe_3C takes less room than the sum of its components when separated as ferrite and graphite; therefore, in any iron the increase in contraction in this test over the amount calculated from a casting in sand is due to the more rapid rate of cooling, which would be practically a constant for the mold.

E. H. Garcin, vice-president of the Trenton Rubber Mfg. Company, Trenton, N. J., advises us that he and associates have purchased the Sheridan Furnaces, Sher-

idan, Pa., from the Pennsylvania Furnace Company. The two stacks have a total annual capacity of 60,000 tons of pig iron.

The French Reciprocity Treaty Renewed.

WASHINGTON, D. C., November 11, 1902.—The French reciprocity treaty, which expired by limitation on September 24, has been renewed for one year at the instance of the French Government. This extension will carry the treaty through the coming short session of Congress, but action must be taken prior to adjournment on March 4 next, or the revival of the convention will prove ineffective unless an extra session should be held next summer.

The action of the State Department in extending the French treaty was unexpected, for the reason that owing to the scant courtesy shown the reciprocity treaties by the Senate the Administration had determined not to take the initiative in asking the extension of any of the pending conventions, and it was not thought that the French Government would solicit a renewal. The desirability of the treaty from the French standpoint was such, however, that a suggestion for its renewal was made by the French Ambassador, in which Secretary Hay promptly acquiesced as a matter of international courtesy.

The intended action of the French Government was recently informally communicated to the diplomatic representatives of other countries with which treaties are pending with the result that requests have been made and granted for the extension of the conventions covering Jamaica, British Guiana, Turks and Caicos Islands, Barbados and St. Croix. The treaties which have not been revived are those covering the Argentine Republic and the Dominican Republic, which have not yet expired. No steps will be taken looking to the revival of the Argentine treaty, but should the Argentine Government ask to have it extended the Secretary of State would hardly be in position to decline, although he is personally opposed to the terms of the treaty which contains concessions with regard to wools of Classes I and II contrary to the instructions given the American Minister to the Argentine Republic, who negotiated the convention.

The most important of the pending reciprocity treaties having been extended it remains to be seen whether the Senate will be disposed to act upon them during the coming session. It must be confessed that the outlook is not encouraging, although Senator Cullom, chairman of the Foreign Relations Committee, declares that one of his first official acts after the convening of Congress will be to call up the French treaty for the consideration of the Senate, and he adds that he will demand action, not alone because he believes the treaty to be eminently desirable from the American standpoint, but also because he thinks it is the duty of the Senate, out of respect to the French nation, to dispose of the convention, either by ratification or by formal rejection.

The suggestion is already current here that all these reciprocity treaties could be held in abeyance pending an investigation to be made by a permanent tariff commission, as recommended by President Roosevelt during his recent Western tour, and that they could be amended with a view to bringing them up to date in all their provisions before they are again laid before the Senate for consideration. Such a course would necessarily involve at least a year's delay, and is strongly opposed by those who favor prompt action on the treaties and who assert that although the conventions were framed two or three years ago, commercial developments in the meantime have only served to emphasize the importance of the tariff concessions incorporated therein.

W. L. C.

The fire loss of the United States and Canada for the month of October reached a total of \$9,593,000, according to the records of the New York *Journal of Commerce*, being a reduction of over \$5,000,000 from the figures for October, 1901. The total loss for the ten months ending October 31, 1902, \$124,000,000, is \$11,000,000 less than the record of the corresponding period of 1901, and \$19,000,000 below 1900. Taken altogether, the fire losses of the current year have been far lighter than for the past few years.

Anti-Friction Bearings.*

BY HENRY R. LORDLY.

In addition to a knowledge of the various bearings now being manufactured a full understanding of the problem necessitates a knowledge of all that has been devised, and the fountain head in this case is the Patent Office.

It having been within the author's province to make

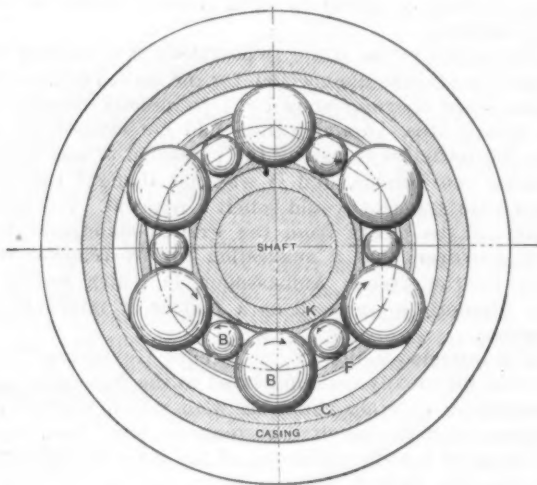


Fig. 1.—Chapman Double Ball Bearing.

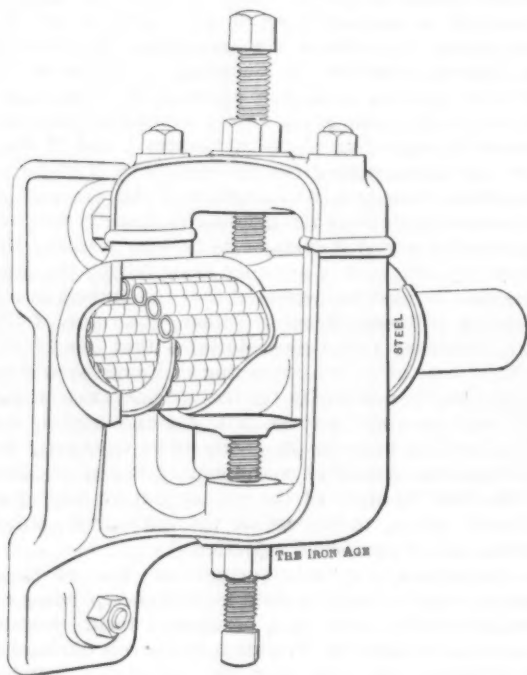


Fig. 3.—Hyatt Flexible Roller Bearing.

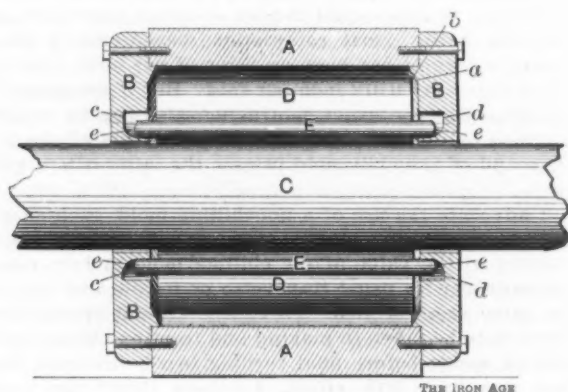


Fig. 2.—Double Roller Bearing.

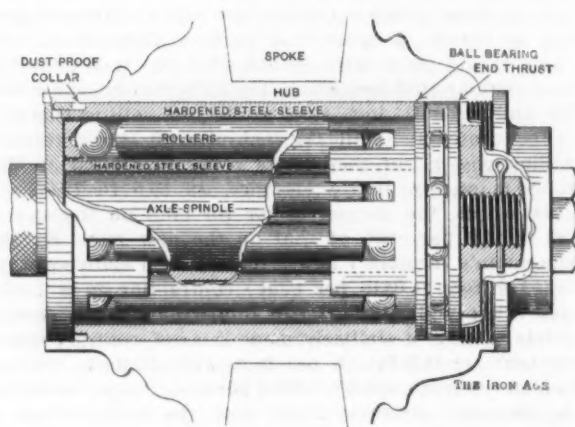


Fig. 4.—The Standard Combination Bearing.

ANTI-FRICTION BEARINGS.

such researches and also to test various contrivances for reducing friction, he begs to incorporate within the limits of this paper such of the data obtained in an investigation lasting nearly one year as will be of interest to the profession at large.

In order to facilitate a clear understanding of the subject this paper will review it in the following order:

1. Classes of bearings devised.
2. Description of one type of each class.
3. Traction tests.
4. Taper roller—Wright's patent.

* This paper was awarded the Feurtes gold medal which Cornell University offers annually to the graduate engineer sending in the best paper on engineering subjects. Copyrighted by the Association of Civil Engineers of Cornell University.

5. Theoretical consideration of Wright's design.

6. Thrust bearings; turntable bearing.

In this discussion the term "ordinary bearing" is intended to mean the common style of lubricated journal now in use. Of 40 patents examined, about one-half were on the straight roller principle, the rest being divided among taper roller, ball, and ball and roller combined designs. For convenience in discussing these bearings are divided into two classes:

1. Caged bearings.

2. Free race bearings.

A caged bearing is one where the roller is held by a collar or where the roller has a pin projecting into a perforated collar. In some of the early designs the weight really comes on the pin.

In the free race the rollers are not held by any other means than the seats between which they are confined, and each roller rotates around the inner seat as an axis. A perfect bearing must contain this feature as well as an absence of end thrust and it will be shown in this article that there is practically but one style of bearing which conforms to these conditions:

Cage bearings include: Ball, straight roller, straight roller and ball combined, taper roller, taper roller and ball.

Free race: Taper roller, ball.

Ball Bearing.

The ordinary ball bearing is now so well known that a description is not necessary here, but the attempt to use this style of bearing in the field of heavy work requires more than passing attention. The author is in possession of various tests of large ball bearings which failed so completely as to require no further evidence of their unfitness for the work attempted. However, there are one or two which have stood testing and Fig. 1 gives the latest and probably the best design on this

principle. This is called the double ball bearing, the larger ball carrying the load, the smaller being the "idler."

F the retaining float for B', C the cup and K the cone. The idler B' is so placed that its center is co-incident with a line connecting the centers of each of the adjacent carrier balls B, and is held in position by a loose free ring, F, that floats with the carrier balls and is supported on the cone or shaft, but not in contact with any of the balls when the same are under load, during which time the idler balls are maintained in the same relative position by rolling contact with the carrier balls. It is thus claimed that a positive revolution of the load carrying balls is insured, and that with this positive revolution all cross or sliding friction is eliminated. In a car bearing it is claimed that by means of key seats and corrugated washers the automatic changing of adjustment by the jar of the car or creeping of the cone as a result of the rolling motion in the bearing is prevented. The adjustment, once made correctly, is permanent until it may become necessary to take up the wear. This wear is stated to be very slight, as has been shown in the tests conducted from time to time. This bearing has been tested on the Fitchburg Elevated Railway, showing a saving of 61 per cent. over the common bearing in a short run.

For heavy work the objection to the ball bearing in

spring roller, Fig. 3, and is known as the Hyatt flexible roller bearing. This bearing consists, in addition to the rollers, of a steel shell, cast iron cap, malleable iron ends, cast iron saddle and a composition guide yoke, all the parts being worked to accurate dimension. The rollers are made of spirally coiled strips of mild steel of the highest tensile strength. Where the load to be brought upon the bearing is excessive the shell is made of spring steel. The cast iron cap is made of high grade iron, carefully ground and fitted. The malleable iron ends are grooved in a lathe, as are also the ends of the steel shell and the bead on the end piece riveted into the groove in the steel shell. Where a continuous nest of rollers is required there is used what is termed a rod yoke, composed of two rings with rods running through the inside of the rollers and riveted on the outside of the rings. This latter method of keeping the rollers in alignment gives the bearings a continuous steady line of motion, and in cases where used saves the metal from wavy lines. The cap and saddle are brought accurately to gauge, so that the rollers will have a continuous, smooth, rolling motion, whether it be on the steel shell or cast iron cap. Tests made for the purpose of ascertaining what the bearing was capable of accomplishing in lessening friction showed that it produced a saving of 25 per cent. of the power absorbed in transmission over a shaft running on ordinary bearings.

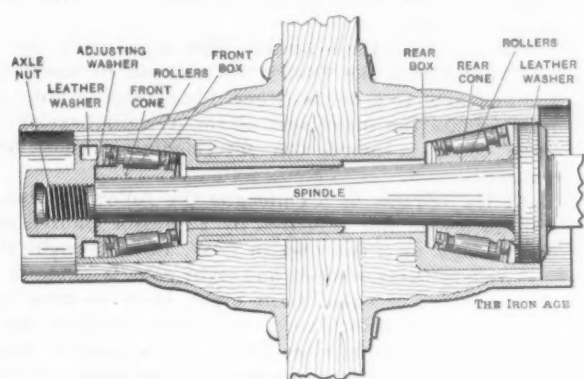


Fig. 5.—Caged Taper Roller Bearing.

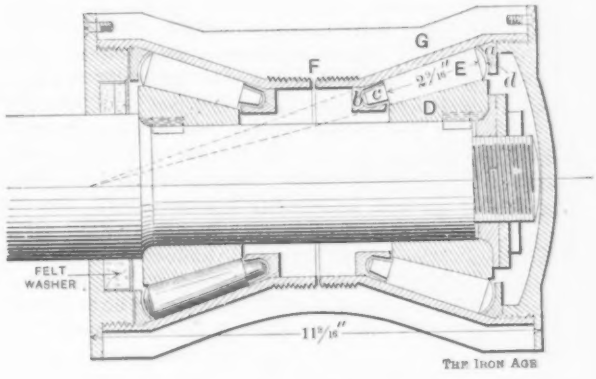


Fig. 6.—The Wright Taper Roller.

ANTI-FRICTION BEARINGS.

general is the liability to wear both in the case of the ball and in the groove or seat. This is explained by the fact that the ball has two motions in its race around the cone, a turning motion directly ahead, or on an axis parallel to the axle, and a side motion on an axis perpendicular to this axle.

An inventor and a former extensive manufacturer of ball bearings claims that to each two revolutions ahead the ball makes one rotation sideways. Thus a point marked on a ball would trace a serpentine path. The author believes that this contention is practically correct.

Straight Roller Bearing.

This belongs to the caged class, and while more designs have been brought out on this style than nearly all others combined, there are only about two or three that have any merit. In most cases the inability to adjust for wear is the most serious drawback. In one case which the author investigated a straight roller bearing, while showing a saving when first put on, eventually took more power to turn it than the ordinary journal. This was in heavy work.

Fig. 2 illustrates a bearing of this class which is now in actual use in many manufacturing plants, and the makers state, with some reason, that it has proved all that is claimed for it. Its employment in places where the end thrust is a minimum is doubtless its strongest point. In the cut shown D is the bearing roller, E the separating roller, d its bevel end and e the groove into which it fits. The lack of adjustment for wear is probably its weakest point.

Another style of the straight roller class contains a

Combination Bearings

include a number of designs employing a straight roller and a ball at ends of each roller to take the thrust; a ball and roller, the ball being between; and a number of complicated combinations of balls and rollers, most of which are more novel than useful. As in some other cases, a multiplicity of parts, inability to adjust for wear and cost of construction destroy any great chance of commercial value. Fig. 4 shows probably the best bearing of this style and one evidently of sufficient merit to warrant its manufacture. As an axle bearing it has evidently had some success and the following tests made with a United States Army wagon fitted with the device will prove interesting.

The tests were made on asphalt, Belgian block and common dirt roadways:

	Pounds pull.
Asphalt, test with common axle.....	100
Asphalt with roller bearing axle.....	25
Asphalt with common axle, starting load.....	450
Asphalt with roller bearing axle, starting load.....	220
Asphalt with 8 per cent. grade, common axle.....	400
Asphalt with 8 per cent. grade, roller bearing axle.....	170
Belgian block, common axle.....	165
Belgian block, roller bearing axle.....	75
Dirt road, common axle.....	260
Dirt road, roller bearing.....	100
Dirt, starting, common axle.....	850
Dirt, starting, roller bearing axle.....	400

The "pull" means the force necessary to start the wagon. This bearing is known as the Standard and is manufactured in Philadelphia.

Fig. 5 illustrates a caged taper roller bearing used principally on vehicles. It will be noticed that the roll

ers have two grooves which fit over a projection or rib on the seat. These grooves are intended to keep the rollers in place laterally; to prevent twisting or turning on the cones. The manufacturers of this bearing claim a general saving of 50 per cent. when it is used on vehicles in ordinary service. On a draft test on a level, comparing with a common axle, the saving claimed is in the proportion of 48 to 8. It took 48 pounds to start the vehicle with the ordinary axle. At sight one would imagine that wear would be a large item against the bearing, especially in heavy work. The author has made no personal tests in this case.

We have now considered in brief the chief bearings under the respective heads of the classification given at the beginning of this paper. Assuming that these devices are capable of doing all that is claimed in the way of reducing friction, it is evident that for general use the following objections are of moment:

1. First cost.
2. Liability to wear.
3. Multiplicity of parts.

In addition to these it is questionable if any one of the bearings is adapted to all the uses that a bearing can be put to.

Taper Roller.

This brings us to the most important division in our classification—taper roller, free race, uncaged bearing. Of a limited number of patents on this style there is practically but one bearing capable of being applied universally and which embodies a principle not covered by any other. This is known as Wright's design and, like a great many other clever devices, was invented by a citizen of the United States. It is not a haphazard invention, but simply the boiling down of the inventor's experience obtained while manufacturing ball bearings, of which he was practically the inventor. The objections already stated in respect to many other styles of bearings were evidently well understood by this inventor, his experiments culminating in the design of a bearing based on a principle proven by him, and which is stated in his claim as the "Angle of Repose."

Fig. 6 is a cut of this bearing taken from the original drawing of a journal for a street car. An inspection will aid an understanding of the descriptions to come of its theory and mechanical features. The author believes that the description given by the inventor in his patent claim is the most concise and clearest, and Fig. 6 has been lettered correctly so that the reader may follow.

"In my experiments I have discovered that if the angle formed by the line of direction of the resultant pressure exerted on the bearing with the perpendicular to either or both the treads D and the treads G is greater than a certain critical angle which I have denominated a 'reposing angle,' then slipping of the rollers E will occur and a consequent end thrust will be produced. By the term 'reposing angle' I mean to include not only such certain critical angles, but also all angles which are angles of less magnitude. All angles which are of greater magnitude than such critical angle or reposing angle I denominate as 'non-reposing angles.' This certain critical angle depends on the nature of the contacting surfaces and can be determined only by experiment. If the treads D are placed in position at a reposing angle and the treads G are also placed at such an angle, then there will occur binding and gripping of the bearing parts. If, however, the treads D are placed in position at a reposing angle, then the end thrust and binding and gripping of the bearing parts will be substantially eliminated.

"The rollers E are made to fit the inner and outer treads of the roller race, so that each roller is in continuous line of contact with the inner and outer treads of its race and it has therefore a free rolling tread over its entire length. The rollers E are in full series—that is to say, the races are filled with rollers, except that sufficient space is left between them to prevent their binding or engaging in frictional contact when they are carrying the load or pressure exerted upon the bearing. They are free to rotate on their axes and to travel in the race.

"For the purpose of facilitating the setting up and adjustment of the rollers I secure to the ends of the inner treads D retaining rings *a* and *b* respectively and I provide the taper rollers E with pins *d* and *c*, which engage freely with the retaining rings *a* and *b*. By this means I am enabled to retain the taper rollers substantially in place for the purpose of setting up and adjusting the bearing, but this pin and retaining ring plays no part whatever in keeping the rollers in place when they carry the weight or pressure exerted upon the bearing. During such times the pin *c* is entirely free from the retaining ring *b*. When not bearing such pressure the pin *c* and the retaining ring *b* serve only to keep the rollers E in their proper position in the bearing. A small space being left between the rollers E, the rollers will not be in frictional contact with each other when they are carrying the pressure exerted upon the bearing, since they are engaged and picked up by the pressure one after another from their position of contact as they fall from under the pressure to the under part of the bearing or the part of the bearing where the pressure is not felt. In other words, space being allowed for a free action of the rollers, the pressure exerted upon them will tend to separate them and free them from any frictional contact with each other. The outer retaining ring may be formed so as to cover nearly the entire end of the roller, thus, doing away with the outer retaining pin or point *d*." (This is the case in Fig. 6.)

Having heard the inventor's side of the story, we will now investigate the theory, by the aid of mechanics, and endeavor to prove whether it is correct or not. Fig. 7 represents the inner seat of the Wright bearing and three cones in place, the intermediate cones being omitted.

At the request of a colleague the following theoretical discussion was prepared by Professor Church some months ago, as a courtesy to J. W. Ellis, Cornell, '90:

"Rolling Cones.—When one right cone is made to roll upon another of equal slant height, their vertices being first placed in coincidence, it is quite evident that at the end of a complete revolution of the smaller around the larger cone, if the pressure of one upon the other has just been sufficient and of proper direction to avoid causing slipping, the circles of their bases will still be tangent. In other words, neither cone will have progressed in a direction parallel to the axis of the other. Therefore, in the set of conical rollers in this bearing there is no tendency to end thrust so far as the geometrical element of perfect rolling is concerned. If the pressure or tendency to pressure between the cones, however, is not properly directed, a traveling of one cone (parallel to the axis of the other)—viz., a slipping along the element of contact—may take place, but this is prevented by the outer seat or tread in the mechanical device.

"Angle of Repose (Fig. 8.) ('Reposing Angle?')—If a weight, = *W* pounds, is placed on a wedge or conical roller as in figure, and the angle *K* of the wedge or sides of the cone has a value greater than a certain critical value (angle of repose known only by experiment, and depending on the nature of the surface contact), the wedge or cone will begin to slip endwise, and if this is prevented by an obstacle, an end thrust is created against the obstacle, while if that angle is less than *K* no slipping will take place, and if the same obstacle against end thrust is provided no end thrust is occasioned." In the foregoing the axis of the cone is considered horizontal.

"Now let it be oblique, as in Fig. 9. Here slipping or nonslipping will occur, according as the angle *B* (*MN* being drawn normal to the surface *cd* most inclined from the horizontal) is greater or is less than some critical value *B* (or 'angle of repose') for the bearing surfaces *cd*. (This supposes that the bearing surface *ab* is not more slippery than *cd*.) A convenient way of stating the last relation is that the bearing surface *cd* is not capable of reacting against the body above it in a line which makes a greater angle than *B* with the normal *MN*. If, therefore, the equilibrium of the body above it would require a supporting force or reaction

from the bearing $c d$, making a greater angle with $M N$ than B , slipping will occur. In the above, for simplicity, a single body was to be supported, of weight W , and the cone was the only support. Therefore the force whose angle with $M N$ was to be considered, as to being greater or less than B , was the force W acting in a vertical line; the cone itself being considered without weight.

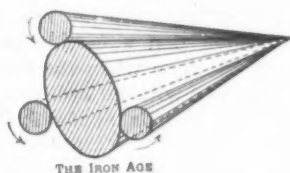


Fig. 7.—Inner Seat of Wright Bearing.

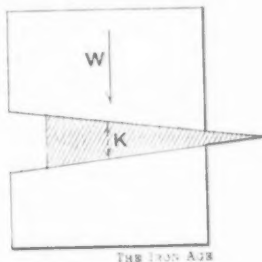


Fig. 8.—Reposing Angle.

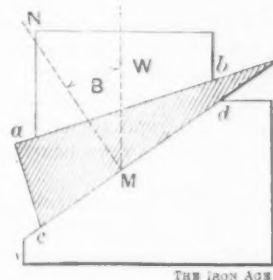


Fig. 9.—Oblique Angle.

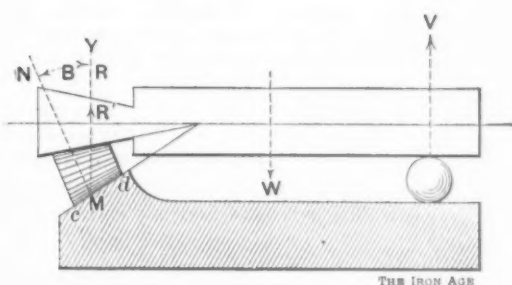


Fig. 10.—Shaft Supported by Conical Rollers and Balls.

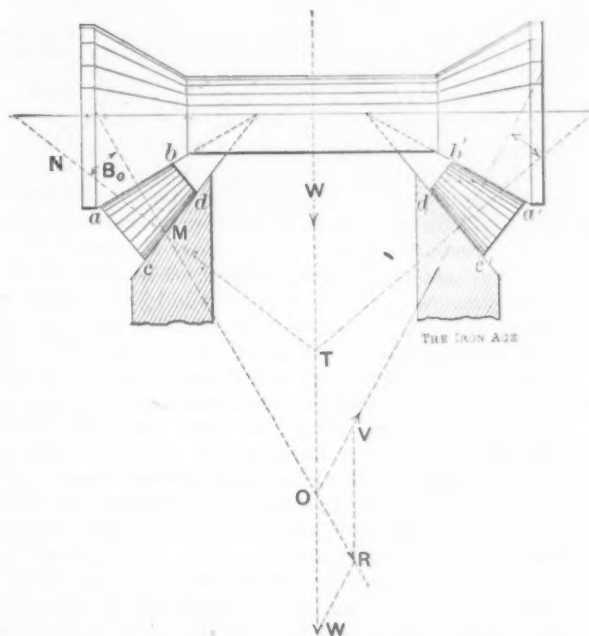


Fig. 11.—Both Ends of Shaft Supported on Conical Rollers.

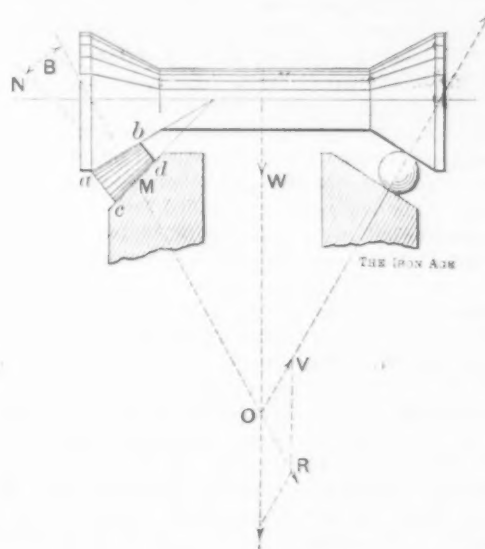


Fig. 12.—Shaft on Conical Rollers and Balls.

resting between (straight and horizontal) cylindrical surfaces at the other extremity, Fig. 10, W being the weight of the shaft and anything carried by it. Here W is vertical and the reaction V furnished by the balls cannot be other than vertical. Consequently the resultant R of W and V must be vertical, and if the shaft is not to move endwise a force, R' , opposite and equal to this resultant, must be furnished by the bearing surface

$c d$; for if pressure R' were not vertical an endwise motion would occur which W and V , being vertical, could not prevent. Hence if the vertical line R makes with $M N$ a less angle than B no end slipping will take place.

"Second Example (Fig. 11).—If both ends of the shaft are supported on conical rollers of similar design and symmetrically placed, and if also the vertical line of the weight W is midway between the ends, it follows from symmetry that there will be no end slipping of the shaft and none for the rollers, if their vertices are in the axis of the shaft. In this case, then, the supporting forces or reactions of the bearing surfaces, $c d$, $c' d'$, will necessarily lie somewhere between two extreme positions, $M O$, $M' O$, and $M T$, $M' T$. With this mode of support, therefore, the resultant of W and V would lie somewhere within the angle $T M O$ and is not vertical nor at right angles to the axis of the shaft. (N. B.— $T M$ makes an angle equal B with the normal to surface $a b$.)

ANTI-FRICTION BEARINGS.

"In the general case, however, we shall have to consider in the place of W the resultant of all the forces acting on the shaft in question aside from the supporting force or reaction which may be expected from the cone. A proper investigation, therefore, of any case requires a knowledge of the mode of support and the forces coming upon the whole shaft and not simply those acting on a portion of it.

"For example, consider case of a shaft supported by conical rollers at the left hand extremity and by balls

"Third Example (Fig. 12).—Let the right hand bearing be a ball bearing with parallel conical treads for the shaft and support. The left hand bearing to have the conical rollers in question. The line of action of the reaction or supporting force V on the right is completely determined here, being at right angles to the bearing surfaces. The line of W need not be midway between the supports. Prolong the line of W to its intersection with that of V and join $M O$. Complete a parallelogram with W as one side, and with a diagonal which shall

ers have two grooves which fit over a projection or rib on the seat. These grooves are intended to keep the rollers in place laterally; to prevent twisting or turning on the cones. The manufacturers of this bearing claim a general saving of 50 per cent. when it is used on vehicles in ordinary service. On a draft test on a level, comparing with a common axle, the saving claimed is in the proportion of 48 to 8. It took 48 pounds to start the vehicle with the ordinary axle. At sight one would imagine that wear would be a large item against the bearing, especially in heavy work. The author has made no personal tests in this case.

We have now considered in brief the chief bearings under the respective heads of the classification given at the beginning of this paper. Assuming that these devices are capable of doing all that is claimed in the way of reducing friction, it is evident that for general use the following objections are of moment:

1. First cost.
2. Liability to wear.
3. Multiplicity of parts.

In addition to these it is questionable if any one of the bearings is adapted to all the uses that a bearing can be put to.

Taper Roller.

This brings us to the most important division in our classification—taper roller, free race, uncaged bearing. Of a limited number of patents on this style there is practically but one bearing capable of being applied universally and which embodies a principle not covered by any other. This is known as Wright's design and, like a great many other clever devices, was invented by a citizen of the United States. It is not a haphazard invention, but simply the boiling down of the inventor's experience obtained while manufacturing ball bearings, of which he was practically the inventor. The objections already stated in respect to many other styles of bearings were evidently well understood by this inventor, his experiments culminating in the design of a bearing based on a principle proven by him, and which is stated in his claim as the "Angle of Repose."

Fig. 6 is a cut of this bearing taken from the original drawing of a journal for a street car. An inspection will aid an understanding of the descriptions to come of its theory and mechanical features. The author believes that the description given by the inventor in his patent claim is the most concise and clearest, and Fig. 6 has been lettered correctly so that the reader may follow.

"In my experiments I have discovered that if the angle formed by the line of direction of the resultant pressure exerted on the bearing with the perpendicular to either or both the treads D and the treads G is greater than a certain critical angle which I have denominated a 'reposing angle,' then slipping of the rollers E will occur and a consequent end thrust will be produced. By the term 'reposing angle' I mean to include not only such certain critical angles, but also all angles which are angles of less magnitude. All angles which are of greater magnitude than such critical angle or reposing angle I denominate as 'non-reposing angles.' This certain critical angle depends on the nature of the contacting surfaces and can be determined only by experiment. If the treads D are placed in position at a reposing angle and the treads G are also placed at such an angle, then there will occur binding and gripping of the bearing parts. If, however, the treads D are placed in position at a reposing angle, then the end thrust and binding and gripping of the bearing parts will be substantially eliminated.

"The rollers E are made to fit the inner and outer treads of the roller race, so that each roller is in continuous line of contact with the inner and outer treads of its race and it has therefore a free rolling tread over its entire length. The rollers E are in full series—that is to say, the races are filled with rollers, except that sufficient space is left between them to prevent their binding or engaging in frictional contact when they are carrying the load or pressure exerted upon the bearing. They are free to rotate on their axes and to travel in the race.

"For the purpose of facilitating the setting up and adjustment of the rollers I secure to the ends of the inner treads D retaining rings *a* and *b* respectively and I provide the taper rollers E with pins *d* and *c*, which engage freely with the retaining rings *a* and *b*. By this means I am enabled to retain the taper rollers substantially in place for the purpose of setting up and adjusting the bearing, but this pin and retaining ring plays no part whatever in keeping the rollers in place when they carry the weight or pressure exerted upon the bearing. During such times the pin *c* is entirely free from the retaining ring *b*. When not bearing such pressure the pin *c* and the retaining ring *b* serve only to keep the rollers E in their proper position in the bearing. A small space being left between the rollers E, the rollers will not be in frictional contact with each other when they are carrying the pressure exerted upon the bearing, since they are engaged and picked up by the pressure one after another from their position of contact as they fall from under the pressure to the under part of the bearing or the part of the bearing where the pressure is not felt. In other words, space being allowed for a free action of the rollers, the pressure exerted upon them will tend to separate them and free them from any frictional contact with each other. The outer retaining ring may be formed so as to cover nearly the entire end of the roller, thus, doing away with the outer retaining pin or point *d*." (This is the case in Fig. 6.)

Having heard the inventor's side of the story, we will now investigate the theory, by the aid of mechanics, and endeavor to prove whether it is correct or not. Fig. 7 represents the inner seat of the Wright bearing and three cones in place, the intermediate cones being omitted.

At the request of a colleague the following theoretical discussion was prepared by Professor Church some months ago, as a courtesy to J. W. Ellis, Cornell, '90:

"*Rolling Cones.*—When one right cone is made to roll upon another of equal slant height, their vertices being first placed in coincidence, it is quite evident that at the end of a complete revolution of the smaller around the larger cone, if the pressure of one upon the other has just been sufficient and of proper direction to avoid causing slipping, the circles of their bases will still be tangent. In other words, neither cone will have progressed in a direction parallel to the axis of the other. Therefore, in the set of conical rollers in this bearing there is no tendency to end thrust so far as the geometrical element of perfect rolling is concerned. If the pressure or tendency to pressure between the cones, however, is not properly directed, a traveling of one cone (parallel to the axis of the other)—viz., a slipping along the element of contact—may take place, but this is prevented by the outer seat or tread in the mechanical device.

"*Angle of Repose* (Fig. 8). ('Reposing Angle?')—If a weight, = *W* pounds, is placed on a wedge or conical roller as in figure, and the angle *K* of the wedge or sides of the cone has a value greater than a certain critical value (angle of repose known only by experiment, and depending on the nature of the surface contact), the wedge or cone will begin to slip endwise, and if this is prevented by an obstacle, an end thrust is created against the obstacle, while if that angle is less than *K* no slipping will take place, and if the same obstacle against end thrust is provided no end thrust is occasioned." In the foregoing the axis of the cone is considered horizontal.

"Now let it be oblique, as in Fig. 9. Here slipping or nonslipping will occur, according as the angle *B* (*MN* being drawn normal to the surface *cd* most inclined from the horizontal) is greater or is less than some critical value *B* (or 'angle of repose') for the bearing surfaces *cd*. (This supposes that the bearing surface *ab* is not more slippery than *cd*.) A convenient way of stating the last relation is that the bearing surface *cd* is not capable of reacting against the body above it in a line which makes a greater angle than *B* with the normal *MN*. If, therefore, the equilibrium of the body above it would require a supporting force or reaction

from the bearing $c d$, making a greater angle with $M N$ than B , slipping will occur. In the above, for simplicity, a single body was to be supported, of weight W , and the cone was the only support. Therefore the force whose angle with $M N$ was to be considered, as to being greater or less than B , was the force W acting in a vertical line; the cone itself being considered without weight.

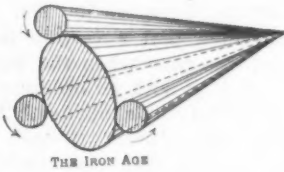


Fig. 7.—Inner Seat of Wright Bearing.

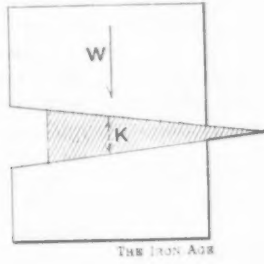


Fig. 8.—Reposing Angle.

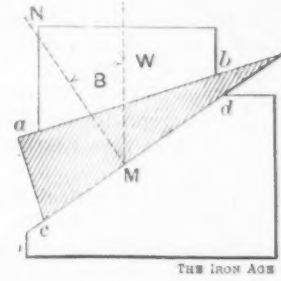


Fig. 9.—Oblique Angle.

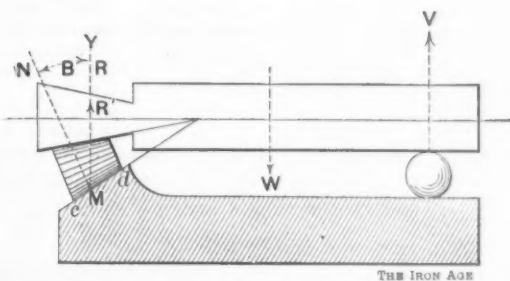


Fig. 10.—Shaft Supported by Conical Rollers and Balls.

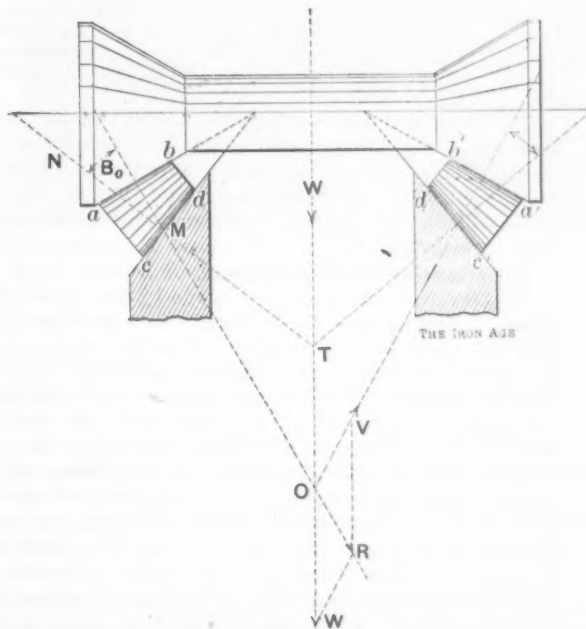


Fig. 11.—Both Ends of Shaft Supported on Conical Rollers.

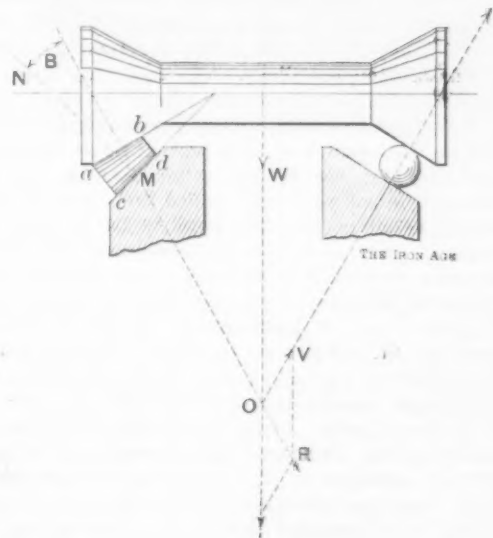


Fig. 12.—Shaft on Conical Rollers and Balls.

ANTI-FRICTION BEARINGS.

"In the general case, however, we shall have to consider in the place of W the resultant of all the forces acting on the shaft in question aside from the supporting force or reaction which may be expected from the cone. A proper investigation, therefore, of any case requires a knowledge of the mode of support and the forces coming upon the whole shaft and not simply those acting on a portion of it.

"For example, consider case of a shaft supported by conical rollers at the left hand extremity and by balls

resting between (straight and horizontal) cylindrical surfaces at the other extremity, Fig. 10, W being the weight of the shaft and anything carried by it. Here W is vertical and the reaction V furnished by the balls cannot be other than vertical. Consequently the resultant R of W and V must be vertical, and if the shaft is not to move endwise a force, R' , opposite and equal to this resultant, must be furnished by the bearing surface

$c d$; for if pressure R' were not vertical an endwise motion would occur which W and V , being vertical, could not prevent. Hence if the vertical line R makes with $M N$ a less angle than B no end slipping will take place.

"Second Example (Fig. 11).—If both ends of the shaft are supported on conical rollers of similar design and symmetrically placed, and if also the vertical line of the weight W is midway between the ends, it follows from symmetry that there will be no end slipping of the shaft and none for the rollers, if their vertices are in the axis of the shaft. In this case, then, the supporting forces or reactions of the bearing surfaces, $c d$, $c' d'$, will necessarily lie somewhere between two extreme positions, $M O$, $M' O$, and $M T$, $M' T$. With this mode of support, therefore, the resultant of W and V would lie somewhere within the angle $T M O$ and is not vertical nor at right angles to the axis of the shaft. (N. B.— $T M$ makes an angle equal B with the normal to surface $a b$.)

"Third Example (Fig. 12).—Let the right hand bearing be a ball bearing with parallel conical treads for the shaft and support. The left hand bearing to have the conical rollers in question. The line of action of the reaction or supporting force V on the right is completely determined here, being at right angles to the bearing surfaces. The line of W need not be midway between the supports. Prolong the line of W to its intersection with that of V and join $M O$. Complete a parallelogram with W as one side, and with a diagonal which shall

take the line O M as direction the value of V can be scaled off. The resultant, R, of W and V makes some angle B with M N, the normal to surface *c d*. If this angle is smaller than B no slipping will occur along *c d*. It is here supposed that O comes on the left of M N prolonged. If O should occur on the other side of M N we should then note the angle that O M makes with a normal to *a b*, instead of to *c d*, to see if it is less than B. In this case the angle with normal to *c d* would evidently be smaller than that with the normal to *a b*.

"In this example, therefore, the line M O is the line, and not a vertical line, whose angle with the normal to *c d* it is important to note.

"*Conclusion.*—It would seem, therefore, that the exemption from end thrust characteristic of this bearing, an uncaged free race bearing employing conical rollers, is due:

"1, to the geometrical feature that the vertices of the conical rollers lie in the axis of the shaft and coincide with those of the conical treads; and,

"2, that the resultant pressure on the bearing in the cases to which the device is applied does not make an angle greater than the critical angle B, or angle of repose, with the normal either to the inside or the outside rolling surfaces (treads), or seats."

The reader is requested to return to the patentee's description of this taper bearing and note how completely the patentee's claim coincides with the theoretical investigation. The author has not found one case in an inventor's claim, for a bearing at least, where the mechanical results so closely approached the theoretical.

Tests of Wright Bearing.

Practical tests, however, are after all what proves the worth of any friction reducing device. In this respect the Wright bearing apparently stands pre-eminent and for variety of tests ranks high. Authentic long period tests have been made on street cars, gun carriages, shafting, heavy and light vehicles, the bicycle and on thrust designs.

Street Car.—The first test was made on the Cork Electrical Railway, Cork, Ireland, and clearly demonstrated the ability of the bearing to stand heavy work and to save power.

A test showing exactly the amount of power saved was made on the Montreal, Canada, Street Railway under the supervision of J. B. Ingersoll and Professor Owens of McGill College. The following is taken from Mr. Ingersoll's official report, dated April 13, 1901:

"Two cars, exactly alike in every respect, were taken and the standard Peckham journal boxes removed from one car and the Wright roller bearings put in their place. The car was then loaded with bags of sand and people, equal to 42 passengers at 140 pounds per passenger. Each car was equipped with the Thompson-Houston recording wattmeter, furnished by Professor Owens of McGill College. Leaving Hochelaga shop, the car went east on Notre Dame, north to Letourneaux, west on St. Catherine to Green avenue, turning at Green avenue and going east on St. Catherine street to Hochelaga, making 53 stops in all and each car stopping at the same point. Total distance traveled by each car 10 6-10 miles. The standard car consumed 15,200 watts, or 20.37 horse-power. The car equipped with the Wright roller bearings consumed 10,120 watts, or 13.43 horse-power." If the roller bearing is taken as the "unit of perfection," then the use of the common journal causes a loss over the amount necessary to run the car of about 54 per cent.

Very many interesting deductions can be made from this result, one of the most striking being that considering the larger amount, 20.37, as the ratio of maximum limit of power, then by adopting roller bearings on all cars the number of cars could be increased one-third on the existing power accommodation. Or by equipping two of the old cars with the new bearing the power thus saved would run one new car fitted with a roller bearing. Thus a road with 200 cars could add an additional 100 cars, without increasing power, by the capital expenditure for 300 sets of roller bearings and no additional yearly cost for power. As a business

proposition this seem one worthy of investigation. The vehicle in test 1 had been in daily use up to April 1, 1892, for 18 months and the bearings had only been taken off once in the last 18 months for examination and cleaning. The rollers showed no sign of wear.

The author witnessed a rather interesting test on a small bearing for a buggy. This bearing was held in a grip by the axle and a weight of 200 pounds suspended on the bearing, which was speeded up to 1000 revolutions per minute. This test was continued for six hours, at the end of which time the bearing was perfectly cool. It ran smooth and without noise.

Traveling Crane Test.—This comes next in importance as a test in heavy work, and particularly so because various styles of bearings were tried. The crane in question was so constructed that a certain portion of its gear was running all the time when the engine was in motion. The first test was with an ordinary bearing (steel) and a load of 9000 pounds applied. Speed of bearing 880 revolutions per minute. Result: Bearing welded together. The second test was made with a three-ply ball bearing. Load, 13,000 pounds. Result: Balls crushed and bearing ruined.

Results of Traction Tests on Wright's Taper Roller Bearing.

No.	Style of vehicle.	Load on axle.	Pull necessary to start vehicle. Common bearing.	Roller bearing.	Remarks. Weight of load only.
1	Freight wagon.	1500 lbs.	37 pounds.	12 lbs.	
2	Gun carriage.	.987 "	55 "	15 "	2 wheels.
3	Freight wagon.	H'y load.	107 "	49 "	
4	Bullion van.	...3 tons.	.....	Dr'n by 1 horse	
4a	Bullion van.	...2 "	Dr'n by 1 horse.	....	Van with roller bearing took one-half more load than this wagon. Total load on axis
5	Freight wagon.	3000 lbs.	107 pounds.	40 lbs.	
6	Freight wagon.	Heavy	216 "	112 "	
7	Omalbus.	.....3200 lbs.	113 "	44 "	
8	Omnibus.	.....with 20 people.	205 "	88 "	Test taken after vehicle had been in daily use for 8 months and traveled 4000 miles.

The third test was made with a Wright taper roller bearing. Load, 25,000 pounds, the full capacity of the crane. The bearing was run for two years, ten hours per day, at 880 revolutions per minute. Result: No sign of wear, although made of soft, untempered Bessemer steel. These tests were made under the supervision of C. J. Zacher, mechanical engineer, of Buffalo, N. Y.

Shafting Test.—A severe test made by the author consisted of bolting two 3-inch taper roller bearings on a drill bed about 30 inches apart. Close to one bearing a 600-pound unbalanced fly wheel was attached, the shaft running through the bearings being about 6 feet long. The pulley was placed at the other end. By fixing a short piece of belting to the pulley and taking one turn about it, and applying weights, it was found that 8 pounds would cause one rotation of pulley. Under the same conditions two plain journals were tried, the shaft, though, being of a smaller diameter. In this case it took 14 pounds to cause one rotation of pulley, including the attached shaft and fly wheel. When speed was applied, 160 revolutions per minute in the first place, it was found that the casing of the taper bearing nearest the fly wheel moved in the clamps and a slight heating occurred, but the bearing near pulley, which was firm, remained perfectly cool.

Loss of Power in Shafting.—A few words on the amount of power expended in turning shafting would not be out of place here. After an extended investigation on this point the author failed to find any cases where the loss in this respect reached what some text books place it at. There are some cases where it might reach 70 per cent. of the total power used, but, as one factory manager put it: "Such cases should not be considered as examples of engineering." The writer found one case as low as 20 per cent., but this was in an exceedingly well managed factory, the total amount of

horse-power being about 350. The majority of plants use from 33 to 40 and sometimes 50 per cent. of the total power to turn the shafting, but when this latter amount is reached or exceeded the reason should be sought for. The fact is, in very many plants, and plants managed by men of ability, too, the actual loss due to friction in shafting is an unknown quantity.

Thrust Bearing.

Thrust bearings, turntable bearings and step bearings are mechanically about the same, and the field is sufficiently large for a good device for this work. Fig. 13 is a caged thrust bearing which no doubt saves some power, but the author does not think the principle so good as a free race, uncaged bearing, such as Wright's.

Fig. 14 is one of the latter, the photo showing one face of the two series of rollers. This nest of rollers is keyed onto the shaft and rotates in the box which is below it in the photograph, the box being held by arms. The thrust is against the outer plate against which the rollers revolve, or there may be a pull inward which brings the side of the bearing shown against its face, when the shaft presses to the left, and on the inner seat for the rollers. The actual bearing from which this photograph was taken was made for a 3000 horse-power water wheel and was tested by the author. The real size of the rollers here is $1\frac{3}{4}$ inches and the thrust to which the bearing was subjected was quite heavy. The speed of the shaft was 186 and therefore the speed of each roller was over 1400 per minute. The first trial showed some heating in the rollers, due to the seat not being in perfect vertical alignment, and one roller was

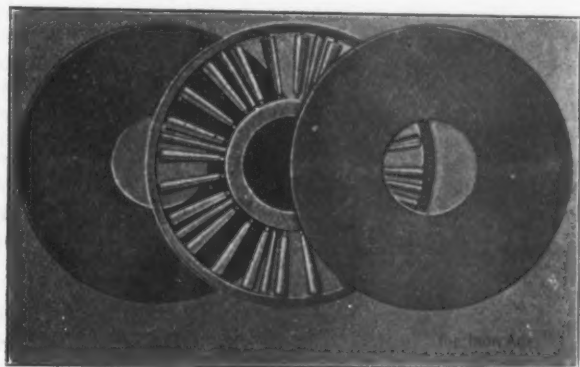


Fig. 13.—Caged Thrust Bearing.

Orient Coal & Coke Company.

A preliminary meeting of Pittsburgh and Youngstown parties connected with the Orient Coal & Coke Company was held in Pittsburgh last week, at which arrangements were made for the opening of newly acquired coal fields in the Connellsville region. This new Company propose to build 500 coke ovens, the product of which will be shipped to valley furnaces. Identified with the company are the Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio; Charles J. Morse, formerly of the Youngstown Bridge Company; Rogers, Brown & Co., Julian Kennedy, the well-known engineer of Pittsburgh, and others. Options have been taken on 2000 acres on Dunlap's Creek, two miles south of Brownsville, in lower Connellsville region, and within

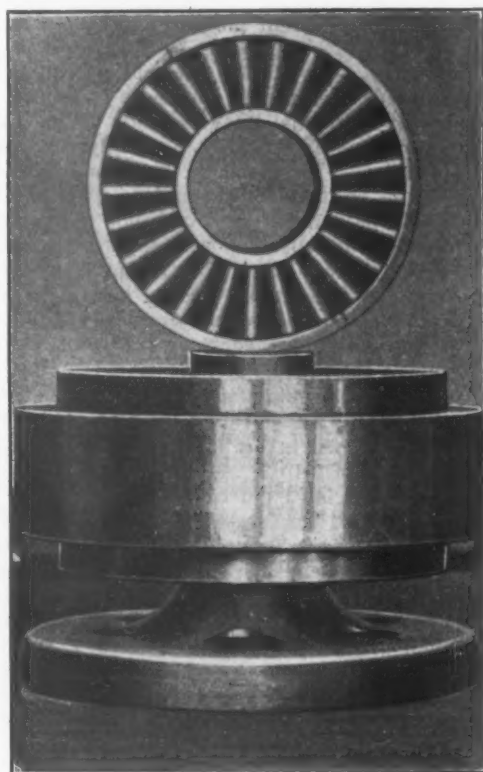


Fig. 14.—Wright Thrust Bearing.

ANTI-FRICTION BEARINGS.

not properly tempered, but the bearing, on the whole, acted well.

The turntable bearing is constructed on the plan of the series of rollers in Fig. 10 and accomplishes wonderful results. For a locomotive turntable 14 rollers 4 inches long and 3 inches diameter at large end are sufficient.

The Noelke-Richards Iron Works.—The Haugh-Noelke Iron Works, manufacturers of structural iron, and the Indiana Ornamental Iron Works, manufacturers of ornamental iron work of all kinds, both of Indianapolis, Ind., have consolidated and will be known in future as the Noelke-Richards Iron Works. The capital stock of the combination is \$175,000. Fred. Noelke has been chosen president, Hugh R. Richards, secretary, and James A. McKim general manager. These officers, together with Christian Waterman and W. J. Richards, comprise the Board of Directors. The new company will occupy the plant now utilized by the Haugh-Noelke Iron Works, which is to be enlarged.

At the Düsseldorf Exhibition, which has just terminated, the highest award of merit, the gold medal, was awarded the Hunt conveyor, manufactured by the C. W. Hunt Company, West New Brighton, N. Y.

a day or so it will be decided whether the entire tract or 1500 acres of it will be taken over. A 9-foot vein runs through it, and a shaft will at once be sunk for its development. The site is located on the Pittsburgh & Lake Erie and Pennsylvania lines. It is the purpose to proceed at once with the work, and the promoters expect to be making coke about May 1, although it is possible that it will be nearer the middle of the year before it can be done. At first 500 ovens, with a daily capacity of 1000 tons will be built. The company will equip the coal and coking plants with the most modern machinery obtainable, and will operate one of the most thorough plants in the country. None of the machinery or supplies have yet been contracted for. It has not yet been decided whether the company will incorporate at \$1,500,000 or \$2,000,000. Mr. Kennedy will probably be president. The directors will include Mr. Kennedy, Robert Bentley, Charles J. Morse, H. M. Robinson and Reed Kennedy. The organization of the company was largely brought about by the continuous shortage of coke, which has seriously crippled operations of Valley furnaces for some months. It is understood that other Valley furnace interests are seriously considering the matter of acquiring coking coal lands in order to make their own coke. Very high prices have recently been paid for coal properties in the Connellsville region. Upward of \$1000 an acre have been paid for choice lands.

Modern Mechanical Engineering.

A change is taking place in England in regard to the best methods to be adopted to educate the coming generation of engineers. The academic curriculum, which has been so long in favor, is looked upon by some of the leading men as inadequate to the requirements of the present day, the argument being that it does not fit young men to deal with commercial mechanical engineering in all that leads to greater economy and increased output in actual barter and sale. This change of front, in the practice of the last decade, is a very great advance, and if it has come at last it is none too soon, for laymen had seen the necessity for a change a good many years ago. Diplomas and degrees amount to nothing unless they carry with them an ability upon the part of the licensee to put hard money into the pockets of manufacturers. What does it profit the latter to have a long report bristling with carbonic oxide, marsh gas, *et al.*, the nature of which he is totally ignorant of, when what he actually needs is a specific statement of the reason why he burns so much coal to get so little steam, backed up by an offer from an engineer to remedy the faults complained of for so much money, performance guaranteed thereafter or no payment demanded. This is done daily by men who have taken only workshop degrees and have no sheepskins to vouch for their knowledge of the business; it is true that these last are not able to make reports couched in scientific terms, and in a great majority of cases do not know what they have done, or why it was done, from a professor's point of view, but the result of their labors frequently is that the coal men find fault with the manufacturer because his orders are reduced. That is an aspect of the case which the most illiterate look upon favorably. There is no intention in these remarks to belittle scientific attainments, or deride them as useless, but I must be permitted to say that the best evidence of the possession of knowledge in any branch of business is that it gives positive results.

At the last meeting of the British Association for the Advancement of Science Prof. John Perry, president, touched upon the subject mentioned in the caption of this article under the title of "Technical Education," but it deals largely with specific issues and departures in engineering purely. In relation to that stumbling block to the feet of many, who, while possessing great ability as mechanicians lack the mathematical faculty, so to call it, Professor Perry said:

"A great reform has begun already in the teaching of mathematics. In the regulations for the Oxford locals for 1903 Euclid is repudiated; it seems probable that at the end of five years no boy of 15 will have been compelled to undertake abstract reasoning about things of which he knows nothing. He will be versed in experimental mathematics, which he may call mensuration. He will use logarithms, and mere multiplication and division will be a joy to him; and algebra, sines and cosines will be easy.

"When I insist that a boy should be able to compute, this is the sort that I mean. Five years hence it will be called elementary mathematics. Four years ago it was said to be unorthodox, but it is being established in every school in the country. Formerly, on starting an evening class in academic mathematics, 200 or 300 would be present at the opening, but in a night or two there would be practically none. In practical mathematics the classes are undiminished all winter. The average boy has hitherto been taught as if he intended to become a Newton or a La Place; he became stupid and learned nothing. I am sorry to say that the teaching of mechanics and mechanical engineering through experiment is comparatively unknown; writers of books and university courses, with but one splendid exception—Professor Ewing—assume that undergraduates are taught mechanical engineering as a logical development of one or two axioms. What we really want is only a few fundamental ideas about momentum and the transformation of energy, properties of materials, &c., in order that they may become part of a student's mental equipment that he uses constantly."

Cut and Dried Rules Objectionable.

Professor Perry went on to say that labor saving rules which are soon forgotten should be displaced by one or two ideas which a man's common sense will enable him to apply to any problem whatsoever and cannot be forgotten; upon this a youth of good mathematical attainments may build a superstructure more elaborate than even Rankine, Maxwell or Kelvin dreamed to be possible. When a man or boy of any age enters a technical college how should he be taught? Professors Ayrton, Armstrong and myself have adopted this plan: Whether he comes from a good or bad school, approach his intelligence through the experience he already possesses. This involves that the teacher shall take the point of view of the teacher instead of the reverse. Give the pupil a choice of many directions in which he may study, and let lectures be of such a character as to show him how to teach himself, both by experiment and the use of books; except for help and direction when asked for leave him largely to himself. I much prefer to have classes of students with varied experiences because of the help they are to their fellows.

Actual Experimental Research.

Concerning the value of this practically applied, Professor Perry said: In the Finsbury College there were many machines which could be experimented with occasionally; boys were taught to make drawings in pencil only, also tracings and blue prints that would be respected in the shop, instead of drawing class drawings, which are not respected anywhere, but the most important part of the course was that of the laboratory, in which every student worked, making quantitative experiments. An offer of a 100-ton testing machine was made to the institute but refused as nonessential. There is very little value in such a machine; the student thinks of the big machine instead of the tiny specimen. Young students loaded wires and beams with actual weights and saw exactly what happened; they experimented with an old screw jack as to its efficiency under certain loads as intently as if no one had ever made such experiments before. An old fly wheel, bought from a junk dealer, had kinetic energy imparted to it by means of a falling weight and occupied the attention of four white headed directors of an electric company for many weeks; at the end of that time they had most useful knowledge in important principles of mechanics.

Hard Hits at Routine Demonstrators.

Perhaps teachers in the larger colleges will smile upon hearing this called laboratory work. True, it was elementary mechanics, but is not every principle which every engineer constantly needs called elementary by superior persons? I find that these very elementary propositions are quite unknown to many who have passed through elaborate mathematical studies of mechanics. Students found out in that laboratory the worth of formulas, and gained courage to make calculations from them, for they had found out the extent of their own ignorance.

A great difficulty in all laboratory work is to find demonstrators who are both wise and energetic. Through foolishness and laziness combined the most perfect systems become unmeaning routine; the smoother it works the less educational it is. In England just now the curse of all education is the small amount of money available for salaries of teachers—just enough to attract mediocre men. I have been told and I can easily imagine that such men have one talent overdeveloped—a talent for making their job softer and softer, until at length they merely sit at a table, maintaining discipline by their presence; only answering the questions of such students as are inconsiderate enough to come and worry them. In such cases it is absolutely necessary to derange their clock work routine, and after an artificial earthquake or two one is reminded of what occurred at the pool of Bethesda, whose waters had their healing virtues restored after an angel had troubled them. To effect a permanent cure of perfunctory service there should be better salaries paid to obtain better men.

Electrical Engineers Lead.

Electrical engineers have enormous advantages over their brethren in other branches of the profession; every-

thing lends itself to exact calculation, and a complete machine or any of its parts may be submitted to most searching tests, since these tests, unlike those applied by other engineers, do not destroy the body tested, but for this very reason the electrical engineer cannot have that training in the exercise of his judgment in actual practical work after he leaves college that other engineers have. In railway and civil engineering generally the engineer is wholly confined to natural conditions, which are never twice the same. There are no simple laws as to the way in which sea and river currents act upon sand and gravel, and engineers who have to deal with these are constantly appealing to nature, bringing to bear all that their past experience has taught them.

Pure Mathematics.

Mathematics and physics, also chemistry, are usually taught in water tight compartments, as if they had no connection with one another. This is particularly objectionable in an engineering college.

Every subject should be taught from the professional work in which an engineer is engaged. He has wasted his time if he is unable to answer any question in pure mathematics found in examination papers. The usual teacher thinks the most of the very parts in mathematics that are useless to engineers who employ them as tools of their trade; those which would be useful to him he never reaches. Luckily the physics professor has a smattering of engineering, sometimes; at any rate he respects it, but he is apt to teach, as mechanics, the pseudo mathematics which forms 90 per cent. of the alleged theory to be found in so many French and German works upon machinery. As pure mathematical exercise work it is meaner than the stupid exercises in school algebras; as pretended engineering it does much harm, because a student does not find out its futility until he has gone through it, when his enthusiasm for engineering problems has been permanently injured. But how is a poor mathematical professor who dislikes engineering, feeling, doubtless, like Pegasus harnessed to a grocery wagon, to distinguish good from evil? He fails to see how worthless are some of the books on "Theoretical Mechanics," written by mathematical coaches to enable students to pass examination; where an engineer teaching mathematics would cut out all that is useless and base his reasoning upon the experience already possessed by the student.

Engineering Knowledge Indispensable to Teachers.

I think every teacher should have some acquaintance with engineering, and it is quite as important that professors in engineering should keep up with their calling—that is, the advances made in it. One who is not in competition with others very speedily becomes antiquated in his practice; the designing work in his drawing office is hopelessly out of date, and he is apt to lecture upon old difficulties in work which have long been overcome. His pupils have small interest in his teaching, because it is merely academic and lifeless, and even if he has done good work in the past his pupils have but slight respect for him now.

Engineers of the Future Will be Highly Educated.

The average man in future will be highly educated; this means very much more personal attention from thoughtful teachers. Is England prepared to pay for it? If not she must be content to see her average men uneducated. The average man looks askance at college trained engineers, and is, in fact, opposed to them, and I think, on the whole, that he has much justification for his opinions, for university degrees are often conferred upon students who follow courses in which they learn little but how to get by the Board of Examiners. What we should strive for is a system which will suit the British boy and man. The former has been called stupid so often that he is in much danger of becoming so, but we may be sure of one thing, that is, he will find some way to escape from the stupefying kind of school work to which the German boy must submit. If it were possible to compel the British boy to pass through such an examination upon leaving school at 19 as his German brother does, there would be no demand in England for the manufactured article. But is it possible to make an

English boy into an obedient academic machine without individuality or invention by teachers who are themselves lacking in engineering knowledge? No; we must have a British system of education; we cannot go on much longer as we have in the past, but it must be one that will commend itself to employers. Of my Finsbury students I think that I may say that not one failed to get into some works upon a two or three years' engagement without paying any premium; this was one test of their technical ability, and experienced men said it was impossible. But employers must co-operate if they want the real article in engineers in lieu of tyros. Much of the training is in actual commercial shop work, which cannot be given or obtained in any technical college. When I attended the Finsbury College in winter I was permitted to work in a foundry in summer. In Japan the same policy prevails, and in Germany also. There the great unions of manufacturers gave the privilege of a year's work in their shops to polytechnic students, but it seems to me that these men are much too old to learn engineering, and a year is too short a time if the finished product is to be a valuable man.

Not Alarmed by Loss of Prestige.

No right thinking engineer has been scared by the newspaper writers, who tell us of our loss of supremacy in manufactures, but I think we all admit the need of reform in some directions in our present methods, especially in the matter of education. People talk of the benefit to workingmen's ideas by the long strike of two years ago, but it is to be hoped that employers' eyes were also opened to the fact that their shops were quite out of date. All of us must realize that there is far too much unskilled labor throughout English works, every one, from owner to core boy, included. Possibly there are some kinds of manufacture so systematized that they can be wound up daily like a clock and go on without further heed everywhere, but this is assuredly not true of any branch of engineering. Machines may be wound up, but certainly not engineers. Millions may be employed as capital, but they will be wasted if the unskilled labor of mere clerks is expected to take the place of trained men throughout, and no matter how ingenious or reliable automatic tools may be they will not enable us to dispense with the services of thoughtful, skilled mechanics with brains.

The Engineer the Napoleon of the Future.

I laugh at the idea that there are any better workmen than ours, but I consider education of them to be the corner-stone of prosperity in all lines of engineering manufacture. New countries like America and Germany (?) have their opportunity now; they are starting without having to scrap any old machines or old ideas, but they will have their turn, too, and the cost of scrapping will look large in their eyes, but in the meantime they have taught us lessons—the greatest of all lessons—that we must realize that other nations are hungry for our trade, jealous of our supremacy; we may, for a time, lose a little of that supremacy. It is only because we have been too confident that manufactures and commerce, skill in engineering—which Napoleon sneered at—would remain with us forever. Many writers have long pointed out the consequences of neglecting education and the loss of prestige attendant upon it which now alarms newspaper writers. Panics are ridiculous, but there is nothing ridiculous in showing that we can take a hint. Over and over again attention has been called to the fact that the engineer has created what is called modern civilization, giving luxury to the poor and freedom from drudgery to thousands instead of the few. He is doing far more than this in lifting the yoke of superstition from necks that have bowed under it for ages. The study of natural science is alone able to do this, but until quite recently it has not been possible for the multitude. I say that to engineers the world owes the possibility of the study of natural science becoming general. In our country nearly all discoveries come from below. Leaders in science and inventors receive from thousands of obscure sources the germs of their greatest developments, and when the people generally become more familiar with natural science leaders will not only be more numerous but individually greater. The heart breaking jeremiads of enthusiasts in

education would produce but little effect if it were not for the engineer. He has brought peace. He is turning the brown desert into green pasture and producing that intense competition among nations of the earth which compels education. If England has been the last to begin reform, she has been the most steadfast and thorough in maintaining it when once started on it.

International Exposition at Athens.

The International Exposition of Industry, Commerce, Art and Hygiene, which was to have been opened in Athens the 15th of October, has been postponed until the 7th of April, 1903. This postponement has been found necessary in order to allow the Greek Government more time for the organization of the movement. Incidentally, it will allow more time for foreign nations to participate. Frank W. Jackson, United States consul at Patras, says: "Now that six months' additional time is to be given, an intelligent display of American products is made possible. It would be difficult to say along what lines special effort should be made, since

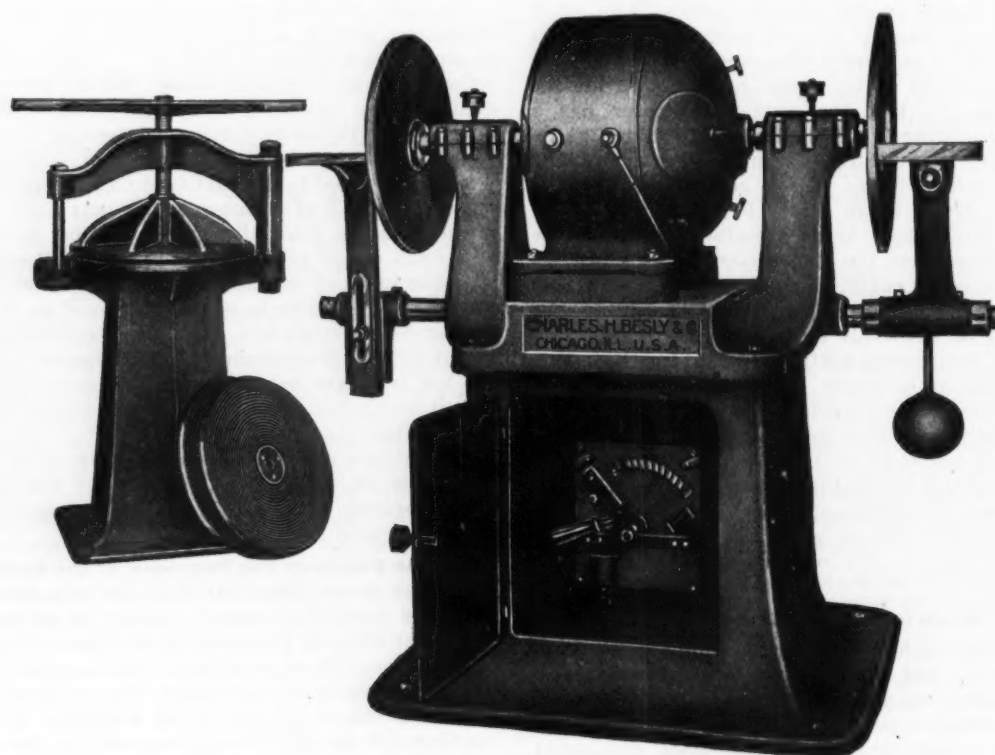
among those enumerated. An error occurred in transcribing the British abbreviation "Mon.," which represents Monmouthshire County, designating it as Montreal.

The correct address is Pontymister Works, Risca, near Newport, Monmouthshire. All communications, however, should be addressed to S. W. Carlton & Co., 6 Billeter street, London. The list failed to mention the Waterloo Works, Machen, near Newport, Monmouthshire, where there are four mills on tin plate. At Risca the firm have nine mills on black plate and three on sheets.

In the list of principal structural iron and steel manufacturers the name of Andrew Handyside & Co., Limited, Britannia Iron Works, Derby, was omitted.

The Gardner Motor Driven Grinder.

The high speed at which it is desirable to run grinding machinery affords one of the best opportunities for the application of electricity as a motive power. Chas.



THE GARDNER MOTOR DRIVEN GRINDER.

the Greek market is open to almost everything in the way of manufactures. Certainly, farming implements, mechanical instruments and devices of every sort, including typewriters, letter and printing presses (particularly hand and foot power presses), engines of various types, currant-cleaning machinery, lighting apparatus, lamps, dynamos and electrical appliances, and a long list of similar goods will find favor with the Greek people. It is probable that many of the articles displayed could be disposed of in this market, and such as could not be sold at once could be continued on exhibition at a nominal price by what is to be known as the American Importers' Association, which will undertake, when formed, the display and sale of American goods of all kinds. Direct boats are now running between New York and Piræus, which will insure good transportation rates and quick and safe service."

English Iron Manufacturers.

In the issue of *The Iron Age* of October 2, on page 26, we printed a list of leading manufacturers of iron and steel in Great Britain.

We are advised that one error crept into this list. The Monmouthshire Steel & Tin Plate Company, Cambrian Chambers, Cambrian Road Newport, Montreal, was

H. Besly & Co., Chicago, were one of the first to recognize this fact and early adopted the motor as the most effective means of running the Gardner grinder. The accompanying illustration shows the new electric type of grinder, the motor being placed centrally between the two spirally grooved disks which form the most prominent feature of the tool. These disks are of steel, and have a spiral, rectangular groove running from near the center to the circumference of the wheel, this groove being cut on each face of the wheel. The groove is 3-64 inch wide and 1-32 inch deep, there being about five grooves to the inch of radius. The grooves serve to hold the emery paper or cloth, which is glued to the disks, securely and communicate a corrugated or ribbed surface to the emery. By this device the cutting efficiency of the disk is increased, and it has been found by practice that the temperature generated by friction is modified by the currents of air which pass between the face of the disk and the material being ground. To insure holding the piece being ground in a correct position adjustable tables are provided suited for different kinds of work. The spindles carrying the disks are made of crucible steel and run in adjustable cast iron bearings having a proportionately large surface. Compression cups are also provided for lubrication. The motor is 5 horse-power of the Crocker Wheeler type.

Coke.*

The subject assigned to me to present to-night is coke. I doubt if there is any other commodity used in foundry practice that is, just at this time, giving you more concern. The centralization of the iron and steel interests has brought about a consolidation of coke interests, the result of which is that the large producers of iron and steel are the owners of their own coke works. This ownership is the manipulation of years, the buying up of coking plants and undeveloped land, until now we find the great Steel Corporation so much in possession, and their requirements of coke so large, that they have announced to the general foundry trade, through their coke department, the necessity of withdrawing their present production of foundry coke after this year. This is the reason, I say, that the matter of coke supply is no doubt causing some of you much anxiety. You perhaps have had a regular source of supply for years, of a quality that suited your work, and you must now look elsewhere and enter the experimental period again. The development of coke production has been so extensive in the last five years that I do not think you need fear any trouble in securing the quantity you want. In fact, there are now about 3000 ovens under construction, or contemplated, in this State, and most of these in the Pittsburgh and Connellsville regions.

The coke subject has been a very interesting one from the date of its introduction in the manufacture of iron, especially since it has to a very large extent displaced anthracite coal and charcoal in the smelting of ores, and much may be said of its past history. I propose, however, to confine this paper more particularly to the period most interesting to our local trade conditions in the coke business from a salesman's standpoint.

About the year 1885 our esteemed fellow citizen, Mr. Frick, the largest producer of Connellsville coke, commenced to buy out his competitors, and continued doing so until he had secured a large part of the developed properties and coking coal land in the region. The result of his action is the extensive coke supply of the United States Steel Corporation to-day. Within the last five years a large addition has been made to the number of coke works in Fayette and Westmoreland counties, Pa., by large consumers and new investors. These developments are principally in the "Klondike" or Lower Connellsville District. Some of them have become the property of the United States Steel Corporation, while a number of other plants there are operated by individuals. Increased developments have also been made in the Greensburg and Latrobe districts.

Quality is the most interesting part of the subject to you, no doubt. Previous to ten years ago the consumers demanded coke made in the Connellsville region between Mount Pleasant and Uniontown, as they considered that the heart of the region, and thought only there could coke of satisfactory structure, hardness and chemical analysis be found. They insisted sulphur should be 0.75 per cent., or not to exceed 0.85 per cent. Even in that section of the coke region the producer tried to impress you with the fact that the deeper the coal the better the coke. This may be true, but it did not prevent the drift mine producer from selling his coke at all times and in the same markets.

The development of coking coal lands adjoining the field above described was afterward commenced, and coke from the north end of the Connellsville region, and the Greensburg field, was accepted with favor. The quality of coal seemed to be satisfactory for coking except that the sulphur in some of it was higher than the trade would accept. This, however, was corrected by the coal washing process. The lower end of the Connellsville field, south of Uniontown, produced a coke that was said to be wanting in strength, but this impression is not held to-day.

The next field to come into prominence was the Mazonetown field in Fayette County, now called the "Klondike" or Lower Connellsville. Previous to five years ago no effort had been made by the farmers to sell these

lands, but about that time some Pittsburgh capitalists, anticipating an increased demand for coke, invested largely in this field, and it is to-day a beehive of activity in coke production. Two trunk line railroads enter the field with additional railroad facilities to be added. This coke is being shipped all over the country and used for all purposes. The quality is good. The same condition exists there as in all other coke territory—viz., that you may find some coal with sulphur a little higher than desired. This, however, if continuous, may be corrected with a washer. No washers, however, are in use there now.

I now want to speak of the quality of coke in general. The demands on the shippers for sulphur of 0.75 to 0.85 per cent. has not been continued during the last few years. We find the foundry consumers are as willing to accept coke with 1 per cent. sulphur as they were to accept 0.75 per cent. Whether the former demand was based on prejudice, or whether you have introduced such methods in your foundry practice as will enable you to use higher sulphur I do not know. The foundry coke shipper and his customer sometimes get into a controversy about quality of coke judging from its appearance, and the objectionable feature may be nothing more than black tops. I have been asked to go miles to see such coke, with the expectation on the part of the buyer that I will acknowledge it inferior, and almost pay him to keep it. The fact is the coke was hard, thoroughly burned, and in every way first class. The discoloration is the result of overheating of the oven, which melts the coal too suddenly, forming a crust over the top, which prevents the gases from escaping. These decompose and leave a deposit of lamp black in the cells of the forming coke. The result is "black tops." We also have in the manufacture of coke "black butts," which we acknowledge are objectionable, owing to the fact that the coke is not thoroughly burned, therefore soft. This coke is found at the base of the oven, due principally to insufficient heat in that part of the oven, and this may be caused by dampness in the earth on which oven is built, or from exposure of the empty oven before charging.

It is surprising how large a number of people interested in the consumption of coke, living remote from the coking coal fields, are ignorant of its mode of manufacture. You have had this subject presented to you very intelligently through the writings of your esteemed associate, Thos. D. West, and through the coke expert, John Fulton. I assume, however, that a concise explanation of the process in this paper would not be amiss.

The style of oven principally used in this country is the beehive type. The by-product type is being introduced, but the preference in America to date seems to be for beehive oven. These remarks, therefore, refer only to the latter. They are built in solid rows of any number consistent with the character of the surface of the ground. They may be "blank ovens" (single row built against a hill) or block ovens (double row on open ground). The coal is carried to them in "larries" holding enough coal to charge the oven, and running on a track built on top of the row of ovens. The coal is charged from the larry into the ovens through a hole in the top. The process of applying the heat is where we find many people mystified, or laboring under a wrong impression. When the oven is new the heat is applied by burning wood until the bricks get thoroughly hot. The oven is then charged with coal, which ignites. The burning is from the top of the oven to the base. When the coke is ready to draw the door in front of the oven is opened and the cooling process started. This is done by quenching with water through a hose pipe, manipulated by the drawer. When cool enough to handle the drawer pulls the coke out on the yard with a large iron fork, finishing the quenching outside, as too much water permitted in the oven would tend to reduce the heat. As soon as possible after the oven is emptied it is recharged from the larry with the same quantity of coal as before, and the burning process commences instantly from the heat of the oven. This continues during the entire period the oven is in operation.

Coke is burned 48 and 72 hours, 48 hours because a certain quantity of coal will burn in a certain sized oven

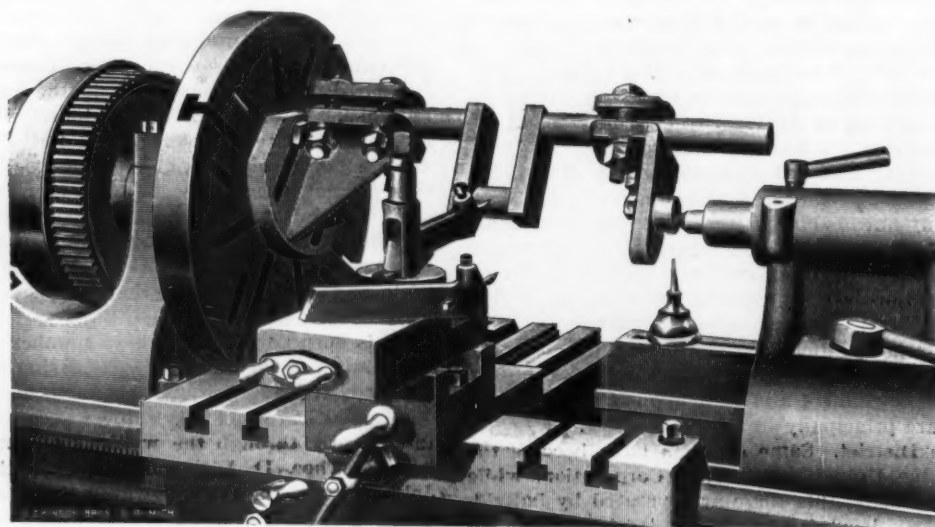
* Paper read by N. P. Hyndman of the Washington Coal & Coke Company before the Pittsburgh Foundrymen's Association on Monday evening, November 3, 1902.

that length of time with best results to produce the highest quality of coke for blast furnace use. Seventy-two hour coke, being burned longer is harder, and consequently of better quality, and is specially adapted to foundry practice.

The abnormal trade conditions existing to-day between the coke seller and buyer as to price is causing much anxiety as to the future. Those of you having contracts, and being regularly supplied, probably do not realize the condition I refer to. Owing to the anthracite strike and the inability of the railroads to move the coke promptly a great scarcity has existed throughout the country, with the result that prices ranging from \$8 to \$14 per ton at ovens have been freely paid for foundry coke for spot shipment, in quantities ranging from 1 to 100 cars. Never in the history of this country has such a state of affairs existed before. Normal conditions would now soon apply if the railroads could promptly move the coke produced. I predict that with better railroad facilities, together with the increased production of coke, the consumer can expect prices that will more readily conform to the prices of iron.

The Hill Crank Turning Attachment.

The Hill Tool Company of Anderson, Ind., have designed an attachment to be used on a lathe for turning



THE HILL CRANK TURNING ATTACHMENT.

the wrists of forged cranks. The device consists of two parts, one to be secured to the face plate and the other to be carried by the tail center. Each part is in the form of a right angle bracket, one face of which is provided with a clamp for holding the shaft. The device used in connection with the face plate is formed with two parallel slots through which bolts are passed, by means of which the shaft can be held at any desired distance from the center, according to the throw of the crank. The tail piece is also provided with an adjustable center rest.

The Christensen Engineering Company.—N. A. Christensen, consulting engineer of the Christensen Engineering Company of Milwaukee, Wis., has opened engineering and sales offices in the Herman Building, Wisconsin street and Broadway, in that city. Mr. Christensen has issued a circular to the trade setting forth the new business relations between himself and the Christensen Engineering Company, with whom until recently he has been connected as superintendent since the organization of the company. The Christensen Engineering Company will hereafter manufacture air compressors under the N. A. Christensen patents connected with air brakes only. Air compressors under the same patents for all other purposes will be under the control of Mr. Christensen, but the manufacture will be done by the

Engineering Company for his personal account. All previous correspondence with the company in relation to the air compressors—not connected with air brakes for electric cars—and all the plans, specifications and patterns, become the personal property of Mr. Christensen. There are now in use over 7000 Christensen air compressors of various sizes and capacities. With the exception of the business relations above set forth, all other interests of N. A. Christensen with the Engineering Company remain undisturbed, Mr. Christensen continuing as consulting engineer of the company.

Drawback on Pig Iron for Sugar Machinery.

WASHINGTON, D. C., November 4, 1902.—A series of drawback regulations embodying somewhat novel features in the methods prescribed for the identification of

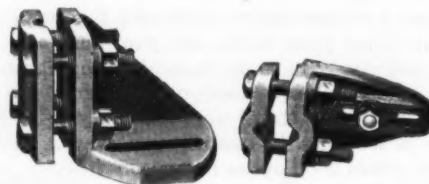


Fig. 2.—Head and Tail Stock Attachments.

raw materials and finished products have been prepared by the Treasury Department upon the application of the Wheeler Condenser & Engineering Company of New York, covering imported pig and domestic scrap iron used in the manufacture of machinery for the production of sugar, consisting of surface condensers, vacuum pans, &c. The drawback allowed will be equal in amount to the duty paid on the imported material used less the usual deduction of 1 per cent., subject to the following requirements:

The manufacturing record must show the number and date of each charge to the cupola, the percentage and weight of imported pig iron and domestic scrap iron used in each charge and the weight of the castings produced therefrom. The castings will be subject to identification by their respective order numbers, which will appear on the molds and on the castings, and by which will be traced the date of the casting and the number of the charge from which any given casting was produced.

The preliminary entry must show the mark and number of each shipping package, as described in the export invoice, the description, cast number and net weight of its contents, and the percentage of imported pig iron on which drawback of duties is claimed. Each package must be marked to show its contents and its gross and net weight. The drawback entry must show the various kinds of machinery exported, the net weight of the same,

respectively, and the percentage and quantity of imported iron on which drawback of duties is claimed, stated separately for each piece and in the aggregate. The designation of each piece must correspond with that appearing for the same piece in the manufacturer's sworn statement.

Prior to liquidation the manufacturer must file with the drawback entry, to form a part of the same, a sworn abstract from the manufacturing record, giving all particulars of manufacture as they appear in the said record, pertaining to the articles covered by such entry, the oath to which shall state that it is a correct transcript from the said record and that the facts therein set forth are just and true.

In liquidation the quantity of imported pig iron which may be taken as the basis for allowance of drawback may equal the quantity used, as declared in the drawback entry and sustained by the sworn abstract from the manufacturing record, provided that in no case shall the weight of the exported machinery be held to exceed the net weight for the corresponding piece, as set forth in the manufacturer's sworn statement before mentioned.

W. L. C.

The Philadelphia Foundrymen's Association.

The eleventh annual, being also the one hundred and twenty-second regular, meeting of the Philadelphia Foundrymen's Association, was held at the Manufacturers' Club in that city on Wednesday evening, November 7. The president, Thomas I. Rankin, occupying the chair, called the meeting to order at the usual hour. There was a large and representative attendance, among which may be mentioned the following:

Geo. C. Davis, Philadelphia.
H. O. Evans, Thos. Devlin Mfg. Company, Philadelphia.
Mark Barr, Linotype Company, London, England.
J. Thompson, J. Thompson & Co., Philadelphia.
Benj. Holt, Camden Foundry Company, Camden, N. J.
Wm. Cannon, Camden Foundry Company, Camden, N. J.
O. J. Ward, Howe Scale Company, Philadelphia.
A. Belfield, H. Belfield & Co., Philadelphia.
F. C. Price, E. J. Etting & Co., Philadelphia.
Paul Vanleet, I. A. Sheppard & Co., Philadelphia.
Harry Taylor, Pettinos Bros., Bethlehem, Pa.
A. A. Miller, *The Iron Age*, Philadelphia.
W. H. Ridgway, C. Ridgway & Son Company, Coatesville, Pa.
J. S. Hibbs, J. W. Paxson Company, Philadelphia.
Nicholas Mager, Bethlehem Steel Company, S. Bethlehem, Pa.
J. Hy. Pepper, Philadelphia.
J. J. McCrystal, Girard Iron Works, Philadelphia.
P. D. Wanner, Reading Foundry Company, Reading, Pa.
Thos. I. Rankin, Abram Cox Stove Company, Philadelphia.
Jas. S. Stirling, Harlan & Hollingsworth, Wilmington, Del.
D. G. Moore, S. L. Moore & Sons Company, Elizabethport, N. J.
Jesse L. Jones, Wm. Cramp & Son S. & E. B. Company, Philadelphia.
Wm. A. Taylor, Cramp Brass Works, Philadelphia.
Earle Mark, A. & P. Roberts Company, Philadelphia.
W. P. Cunningham, A. & P. Roberts Company, Philadelphia.
Robt. Stinson, Delaware River Iron S. & E. B. Works, Chester, Pa.
Jas. B. Strain, Robt. Wetherill & Co., Chester, Pa.
Wm. Wisner, R. S. Newbold & Son Company, Norristown, Pa.
H. F. Fisher, A. B. Farquhar Company, York, Pa.
C. D. Matthews, Camden Iron Works, Camden, N. J.
F. Cooper Pullman, J. Wesley Pullman, Philadelphia.
E. E. Brown, A. D. Wallace and C. R. Brown, E. E. Brown & Co., Philadelphia.
R. C. Oliphant, Trenton Malleable Iron Company, Trenton, N. J.
M. S. Greenwood, Trenton Malleable Iron Company, Trenton, N. J.
S. G. Flagg, S. G. Flagg & Co., Philadelphia.
Wm. Ayton, Abram Cox Stove Company, Philadelphia.
Thos. J. Kelley, Thomas, Roberts, Stevenson Company, Philadelphia.
Howard Evans, J. W. Paxson Company, Philadelphia.
Frank T. Etting, E. J. Etting, Philadelphia.

The reading of the minutes of the previous meeting was dispensed with in the usual manner. The treasurer reported a balance on hand amounting to \$2075.82 with all bills paid.

The Committee on Nominations of Officers of the association for the ensuing year reported as follows: President, Thomas Devlin of Thomas Devlin & Co., Philadelphia; vice-president, James S. Stirling, Harlan & Hollingsworth Company, Wilmington, Del.; treasurer, Josiah Thompson of J. Thompson & Co., Philadelphia; trustees, D. G. Moore of S. L. Moore & Sons Company,

Elizabethport, N. J.; Thomas Eynon of Eynon & Evans Mfg. Company, Philadelphia; Dr. E. E. Brown of E. E. Brown & Co., Philadelphia; R. C. Oliphant, Trenton Malleable Iron Company, Trenton, N. J., and William Han-son, Pennsylvania Iron Works Company, Philadelphia. There being no other nominations, the secretary was ordered by vote of the association to cast a favorable ballot for all the officers, and they were duly elected.

The papers of the evening followed. H. O. Evans read a paper on "The Study of the Cupola," by Arch. M. Loudon, New York (published in the *Journal of the American Foundrymen's Association*, October, 1902), and an abstract from the *Journal of the American Foundrymen's Association*, September, 1902, on the "Discussion of the Melting Ratio in Cupola Practice," was read by James S. Stirling. Considerable discussion followed and various results as to the ratio of iron and fuel in the cupola were mentioned.

D. G. Moore of S. I. Moore & Sons Company said that the question had interested them particularly some time ago and resulted in a careful 60-day test, in which iron and coke were weighed daily, no deductions being made for the scrap or coke remaining after the heat was run. The cupola used was an oval type, 30 x 60 inches. The mixture was two-thirds pig iron and one-third scrap, the total heat 25 tons, and 72-hour foundry coke was used. The result obtained varied as to the temperature of the metal. With good hot iron for machinery castings, 9 to 1 was the average, in some cases 10 to 1 was obtained, and even 11 and 12 to 1. In the last, however, the iron was cold and figures therefore were of no value. In this practice the best results were obtained at an average ratio of about 9 to 1. They prefer the practice of operating two smaller cupolas to one large one, running each hot right up to the end of the heat. In their heats of 25 tons they frequently take four grades of iron from the cupola—soft, hard, chilled and steel mixed—in which cases more fuel is required owing to the blank or parting charge of coke, and ratio in each case becomes lower.

Mr. Rankin of the Abram Cox Stove Company said that in their foundry, where there was a very large amount of light work, castings one-tenth and one-twelfth inch in thickness, and up to 38 inches square, it was absolutely necessary to have hot iron. They could not obtain a better ratio than 7 or 6.8 to 1 with good coke.

Dr. E. E. Brown said that the question of the ratio of coke and iron had been discussed by them for some time, and he believed they were getting as good results as many others. "Ordinarily truthful men are apt to forget" in discussing these figures at times and it is difficult to reach any definite conclusions, besides the conditions existing so alter the cases that comparisons are worthless.

James S. Stirling, W. H. Ridgway, H. O. Evans, S. G. Flagg, Jr., and T. C. Price also took part in the discussion, bring out the question of the number of charging doors best suited for the cupola, their heights and sizes and distances from the charging floor, pressure of the blast, &c. These various points are at considerable variance and subject to the conditions, surroundings and nature of the work to be done in each individual case.

After adjournment the members and their friends proceeded to the roof garden of the club, where the usual luncheon was served.

The Appellate Term of the New York Supreme Court has handed down a decision in which it holds that express companies cannot limit the amount of money damages sustained by the sender of goods by reason of the loss of the goods in transit. The decision is in a suit brought by Jacob C. Simon of the firm of Charles Simon's Sons, New York, wholesale hosiery dealers. The plaintiff claimed that his firm sent lace curtains worth \$250 to a cleaning establishment, with instructions to have them returned by a local express company. The plaintiff also alleges that the goods were lost in transit by the express company. Justice MacLean of the Appellate Term of the Supreme Court sustains the decision of the lower court, which gave the plaintiff a judgment.

An Austrian Continuous Sheet Mill.

In the northern part of Austria there is running a very interesting continuous sheet mill. The general layout will be best understood from the accompanying general plan. There are five stands of two-high continuous rolls, all being alike, having a diameter of 24½ inches and a length of 59 inches. In front of the first stand are two three-high mills, in position as shown, and everything is finally run by gear trains from two engines. The method of working is as follows:

They receive a slab cast direct at the Bessemer or open hearth furnace, which measures 8 inches in thickness and which is delivered cold. It is put into a continuous furnace, and is then rolled down on the large three-high mill to about 3 to 4 inches thick. This is then cut in halves and put into a reheating furnace. One of the halves is taken out and reduced further on the small three-high, and after leaving this three-high runs directly into the continuous stands without a further reheating. The thickness when it leaves this three-high, before entering the continuous stands, is always the same (7 mm. = 9-32 inch), and the reduction is varied on the continuous train to give the required thickness. The sheet is finished about 60 feet long, and is, of course, in all stands at the same time. After leaving the continuous mill the sheet travels on a table to a shear, as shown in the plan. From the layout of the mill, of course, sheets are always rolled single, and never in packs or doubled, and are from 40 to 50 inches wide.

One rather surprising thing is that between the stands, which are about 9 feet from center to center, there are no idle rollers or automatic tables of any kind—

shown in Fig. 2. This gauge corresponds to 2 mm. thick and the dimensions in the sketch are given in those units.

In order to make the mill economical it must work long lengths of sheets, and of course 30-foot lengths would only cut down the variation in thickness in proportion. It is the practice at this mill now to cut the 60-foot sheets into short pieces, so that the variation of thickness is not noticeable for the short length, and either sell or finish to lighter gauges on an ordinary finishing two-high sheet mill. The demand made on the production at this plant is not enough to keep this continuous mill running steadily, and it is reported that it does not pay to run it under these circumstances. It would do so, however, if it could be kept running all the time. The mill, roughly speaking, will turn out in the same time about nine times as much as the ordinary sheet mill on, say, 14 gauge.

The engine for the mill is 1000 horse-power and totally inadequate to run the mill, which has caused endless annoyance and trouble, to say the least.

It is stated that the reason thinner sheets cannot be rolled singly is that the sheet becomes so thin that it will not hold its heat during the rolling, and great variations of thickness are the result. Sheets seldom tear between the rolls if the steel is what it should be.

Ample engine power, greater speed and larger rolls would help to keep the thickness uniform. Some trials have been made of rolling two or more sheets together in a pack, but it is necessary, from the layout of the mill, to heat the first sheet after leaving the small three-high while waiting for the second to be rolled in the same three-high; and as the furnace is some distance away it is very difficult to hold the heat. The sheets rolled in

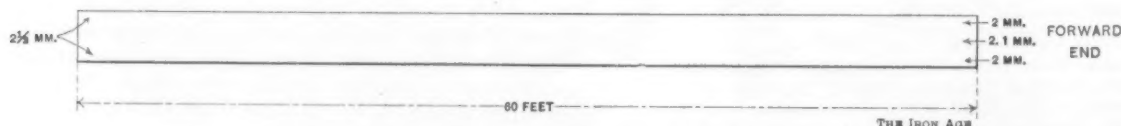


Fig. 2.—Sketch Showing Dimensions of Sheet.

simply guides 6 or 8 feet high and a cast plate between the stands on which the sheet might slide. Nor at the first stand, where the material entered, is there any automatic device for centering.

The speeds of the rolls are as follows, beginning with the first stand: 30, 37½, 45, 52½ and 60 revolutions per minute. It will be observed that to prevent compression or stretch between stands the reduction of all stands is at once fixed, with the exception of the last or fifth stand; for if the rolls of the fifth stand have the proper surface velocity to take care of the elongation given to the sheet by the fourth stand its reduction may be what we please. This cannot be far wrong when assumed at 10 per cent., which is in accord with reductions of preceding stands. In reading the following figures the fact should be borne in mind that the reductions are given in per cent. of the thickness before the pass, and that elongations are given in per cent. of the length before the pass. As the section of the sheet is considered to be the same before and after the passes, 1 plus per cent. of elongation multiplied by 1 minus per cent. of reduction will always equal 1.

Stands	1	2	3	4	5
Revolutions	30	37½	45	52½	60
Elongations, per cent.	25	20	16 2-3	14.3	11.1
Reductions, per cent.	20	16.7	14.2	12½	10

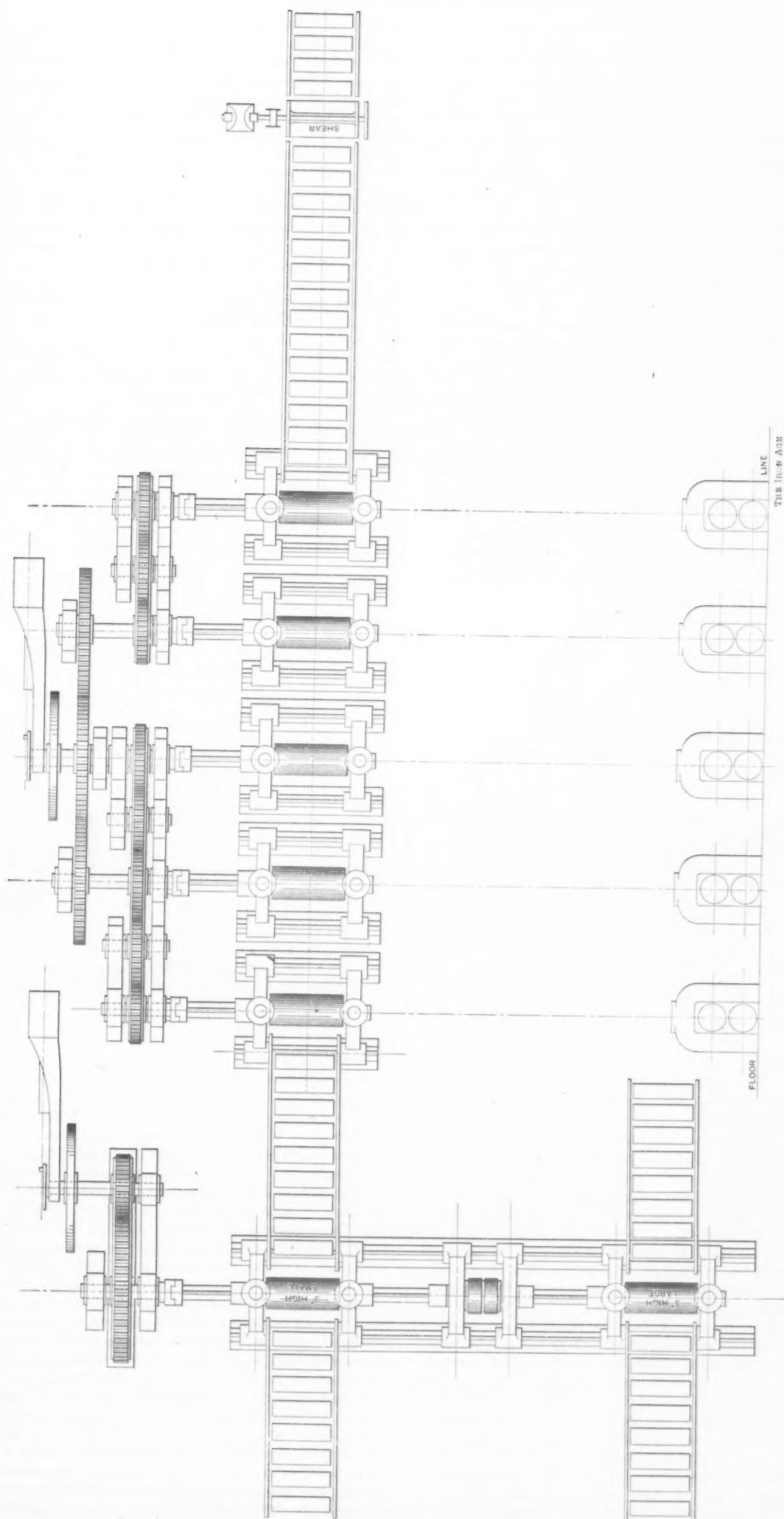
This gives a total reduction of 55 per cent. and a total elongation of 122 per cent. of the original dimensions. But, as a matter of fact, there is often some compression between the stands, and the greatest reduction which it is possible to attain is from 7 mm. (14 gauge) to 2 mm. (14 gauge), or a reduction of nearly 73 per cent. When the mill was visited it was reducing from 7 to 3 mm. (about 12 gauge), a reduction of 59 per cent., only a little more than the figured result of 55 per cent., and it showed neither compression nor tension between stands. It is impossible to go less than this 2 mm. (14 gauge), because the sheet becomes so thin that it loses its heat so rapidly that the back end of the sheet comes out much thicker than the forward end. With 14 gauge the sheet will measure about as indicated at the different points

this way seemed like those rolled singly, non-uniform as to thickness, but enough experimenting on this has not been done to say what gauges or results can be reached. The Austrian engineers express the opinion that a reversing two-high mill receiving alternately the hot and the cold end would help toward keeping the thickness uniform.

"Official Notices."

BY EGBERT P. WATSON.

Persons who keep informed of current events as reported in the daily press must have observed an "official notice" so called, emanating from a body of men who have been defying the laws of the land for months past in an endeavor to establish others of their own devising. The notice in question was to the effect that the long strike of coal miners was "settled" and that the men could now go to work at their lawful avocation—that is to say, some men wholly of their own association and affiliations. Others, American citizens, too, could not go to work without being molested in every way and their lives put in jeopardy if they exercised their inalienable rights. It would seem to the most superficial thinker or observer that the notice was a little premature, inasmuch as the Board of Arbitration appointed to act as judges of all the facts in the dispute will not make their report for several weeks—possibly months. When it is made its provisions may change the aspect of affairs in a way that the disorganized workmen do not apprehend and will not respect if they happen to be onerous as regards their association interests. However this may be, the "official notice" before mentioned does not seem to have changed the situation in any degree, for the outrages against property and person are not checked and the terms upon which the Board of Arbitration are to act have been construed by the leaders as upholding all their demands. The only point the public has gained is that coal is being marketed; the burning question as to



GENERAL PLAN OF AN AUSTRIAN CONTINUOUS SHEET MILL.

whether American citizens must obtain licenses to work at anything in this country from a trades union before they will be permitted to do so being still in abeyance. As this is really the only issue in all cases, it will be seen that the strike question is very far from a final answer. It is needless to argue the point put forward by associations as to their right to quit work, or to organize to advance their own peculiar views as to how the workmen of this country shall get their living; there is no contention upon this subject. It has been broadly conceded time and again. Not only has it been conceded, but in so far as the great majority of workmen are concerned it is settled, for there are only about 9 per cent. of all the men in the country who follow handicrafts that are disaffected; the rest go quietly about their affairs.

The American people are said to be the most forbearing and nonresistant as regards encroachments upon their personal rights of all peoples, and it would seem so from the toleration with which they look upon overt acts of this character. One instance of recent occurrence is a good illustration. An organization known as the Plasterers' Union in this city has recently "resolved" that in future contractors shall deal only with their foremen and have no control over the men themselves; as for the foremen, if they attempt to "rush"

laying down the union law as to what outsiders should do, until, annoyed at his persistence, I threatened him with a charge of disorderly conduct if he did not depart at once. This unlooked-for resistance seemed to convince him that he had accosted the wrong man, and saying that he thought I was a "carpet man" because I carried a bag similar to those such workers use for their tools, he permitted me to depart. This interference with the liberty of the citizen shows the arrogance and assumption of special privilege which characterize unlawful assemblages, for all persons who come together to set aside the written laws of the land are unlawful in the eye of the law. There is ample protection for the people in the statutes now in force; the only laxity is in the lack of observance of them. It is to be hoped that the Board of Arbitration in the case of the miners will make such representations that it will lead to positive action everywhere in this country, so that the right of American citizens to work where they please without dictation from any one will be universally recognized.

The Wharton Automatic Die Head.

From the *London Engineer* we take the following description of a new automatic die head made by Wallwork & Co. of Manchester, England: The special object

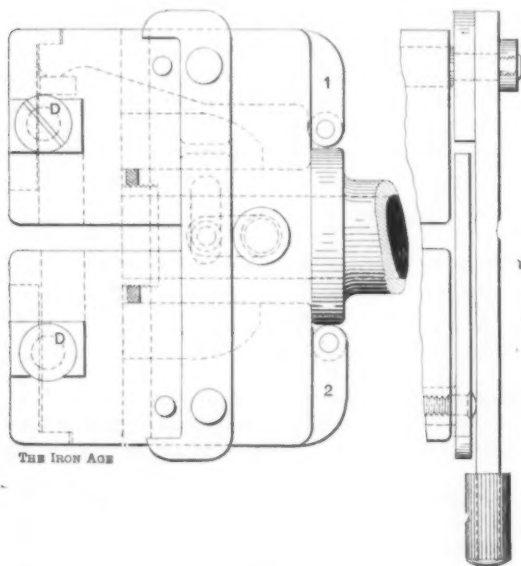


Fig. 1.—Section Parallel with Shank.

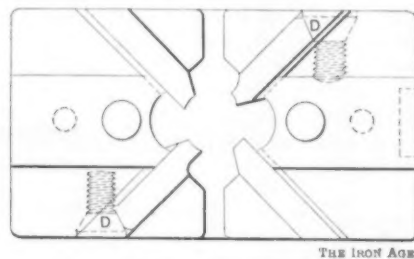


Fig. 2.—Front View.

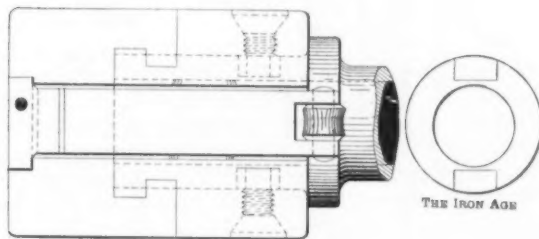


Fig. 3.—End View.

THE WHARTON AUTOMATIC DIE HEAD.

the men (so the edict reads) or harry them in any way so as to expedite the progress of the work they will be answerable to the union for misconduct. As a result of this general order an unfortunate contractor, who was ignorant of the latest decisions of the union, gave orders to the men to do thus and so without asking leave from the foreman. The action of this latter functionary was very prompt. He said to the contractor: "Look here, boss; you are interfering with my men; if you have got anything to say about how the job is to be done tell it to me and I will consider it." This seems ridiculous upon the face of it, but it is an actual occurrence, if the reporter of the *Sun*, one of the most reliable papers, is to be credited.

Another instance, which is within my personal knowledge, happened only a few days ago. I had business in an important store in New York and carried a Gladstone bag to contain small parcels. Upon leaving the place I was followed and accosted as follows by a young man: "Didn't you know we were on strike in there?" Surprised at this demand from a total stranger, I replied that I did not and didn't see what concern it was of mine if there was a strike. The young man retorted that I "had a right to know," and further remarked that I "wouldn't be let" to interfere with them in any way. He kept pace with me for some distance

in designing this apparatus, which is applicable to all kinds of automatic screw machines and hand turret lathes, has been to produce a self opening, closing and adjustable die head, which will not "gape" at the chasers after it has been in use a short time. In Fig. 1 we give a section of the apparatus parallel to the shank, and from this it will be seen that the levers 1 and 2 are directly over the chasers at one end, while the other forms a bearing on the shank collar, so that the levers take their bearing in the back half of the head, Fig. 3. It is thus practically impossible to put any strain on the slides carrying the chaser head. The thrust formed when the screw is being cut is taken directly on the end of the levers. This allows the chasers to be cramped securely. The adjustment is effected by means of the screws D, and a noticeable feature is that should any pressure be placed on these screws they are so arranged that the action is not to strain the thread, but to put the head directly in compression, as will be seen from Fig. 2. The end view, Fig. 3, illustrates the way in which the head is driven from the spindle. By the method adopted the head is allowed to move freely with the least possible friction. With regard to the opening and closing motions, it may be explained that the screw that is being cut draws off the levers from the collar, when the turret becomes stationary. Immediately the levers

leave the collar the springs draw them down to the shank, thus opening the die. The closing motion is effected by the lever at the side of the head. When this is drawn back it comes into contact with the studs let in in the side of the chaser carriers, and draws them down until the end of the lever is clear of the collar. The springs, which are under tension, then draw back the head ready for screwing again.

The Suppression of Smoke in Steam Plants Using Bituminous Coal.*—VI.

BY ALBERT A. CARY, NEW YORK.

Steam Jets for Intimately Mixing the Combustible Gases With the Air Supply.

On February 24, 1838, M. W. Iverson took out an English patent for delivering steam, in jet form, over the fire bed of a boiler furnace, which steam, he stated, "acts as a steam poker to stir about and intermix the air and the gases and so to complete the intermixture wanted for effecting entire combustion." This device is shown in Fig. 19. The jet is placed over the firing

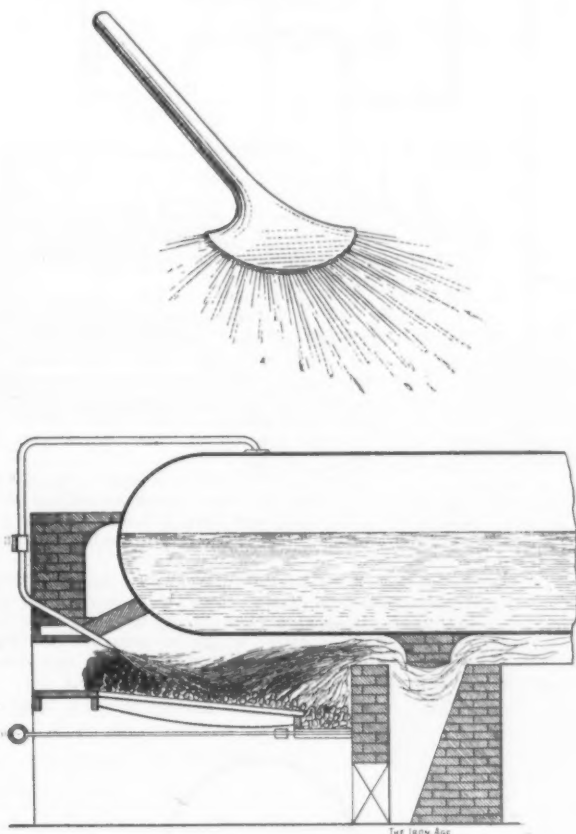


Fig. 19.—Iverson's Steam Jet Furnace.

door and pointed in such a direction as to cause the steam to strike the top of the fuel bed about midway between the front dead plate and the bridge wall. The steam outlet (in the furnace) is flattened so as to cause the steam to issue in a thin, fanlike stream, like the sector of a circle. The principle of operation with this device is as follows:

The volatile gases, after being distilled from freshly charged coal, under conditions of ordinary furnace design, would rise toward the top of the furnace as they traveled along toward the bridge wall and combustion chamber beyond it, escaping very rapidly from a position over the fire bed. The air passing through the grates and fire bed, or coming from any source of secondary air supply, would have but little time to thoroughly mix with the combustible gases before they left the hot furnace chamber where their most rapid combination would take place.

In order to prevent the hurried escape of these gases along with the air necessary for their complete com-

bustion the force of the steam jet is used to drive them back upon the hot fire bed and at the same time mix them together more or less thoroughly before they have time to escape from the hot fire chamber, and according to Iverson's theory, with these conditions a very rapid combustion is forced to take place in the fire box, which condition is conducive to smokelessness and economy.

In order to still further retard the escape of the hot air and combustible gases from the fire box it will be seen that Iverson made use of three bridge walls at the rear of his furnace: 1, the regular bridge wall at the rear of his fire box, which had a bottom opening from the ash pit to admit secondary air behind this bridge; 2, a hanging bridge wall, placed a short distance behind the bridge just described, and, 3, a rear bridge wall practically identical to the first one, excepting the lower air opening, which was placed behind the hanging bridge wall. Thus it will be seen that not only is the velocity of the escaping furnace gases and air retarded by the interference of these walls, but a further mixing occurs here, as has been previously described, under "Various Arrangements of Brick Arches and Furnace Walls."

A number of tests showed that this steam jet and furnace arrangement suppressed the smoke nuisance materially, but no economy of fuel was effected by its use.

In the early part of 1856 M. Thierry patented "A Smoke Preventing System," which is illustrated in its application to a locomotive type of boiler in Fig. 20.

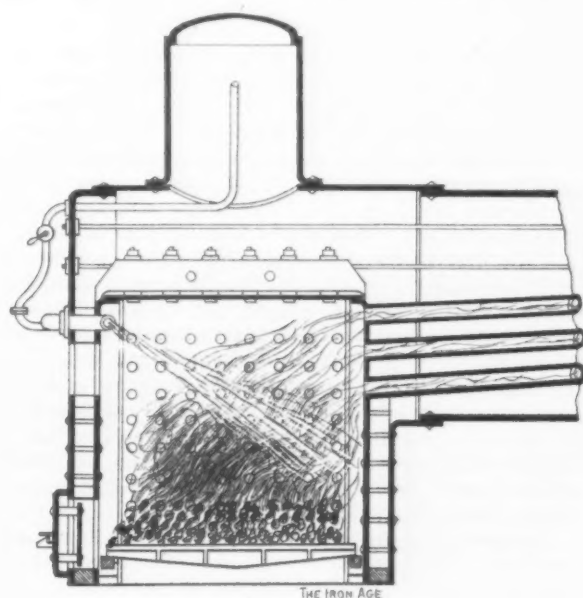


Fig. 20.—Thierry's Steam Jet Furnace.

With this system the steam for the jets after leaving the boiler was made to pass through a superheating coil placed in the fire box or combustion chamber (not shown in the illustration) and was discharged into the furnace from a pipe placed over the firing doors running from one side wall of the furnace to the other, this pipe being perforated with two or three rows of holes, each about 1-16 inch in diameter, which openings directed the jets of steam toward the rear of the furnace, so that they would strike the bridge wall.

This arrangement was found much superior to the Iverson system, both as to smokelessness and economy. With Iverson's arrangement the fire surface was chilled with a quantity of wet steam delivered in considerable bulk, and its tendency to suppress or drive back the air which attempted to flow through the grate and fire bed acted against its successful working.

With M. Thierry's device the superheated steam, finely subdivided into very small streams, acted as a curtain over the fire bed, catching in its rapid flow the rising gases and air from the fire bed and hurling them against the bridge wall without allowing them to escape freely. This caused a churning and mixing action to

* Copyright, 1902, by Albert A. Cary.

take place between the air and gases, thereby accomplishing the required mixture in the hot fire box.

In July, 1857, MM. Molinos and Pronnier patented a system of blowing fine jets of air, just above the fuel bed, through openings placed along each side wall of the furnace, which gave very good results, the great objections being the use of cold air and the necessity for the use of a high pressure blower. This was followed during the latter part of 1857 by a patent taken out by D. K. Clark for a device for injecting air into the furnace by jets of steam.

An American device of similar kind is shown in Fig. 21, taken from the December, 1892, number of the *Locomotive*, published by the Hartford Steam Boiler In-

is materially decreased and in most cases economy in fuel results.

There have also been invented many devices for automatically shutting off the steam from these jets a few minutes after fresh coal has been charged, but these attachments are practically the same as those already described for similarly regulating the supply of secondary air.

For a closing consideration of this subject, I cannot do better than quote the remarks made by William Kent in his work on "Steam Boiler Economy," concerning "Jets of Steam:"

Jets of steam are sometimes blown into the furnace, above the fire, carrying jets of air with them, on the principle of the

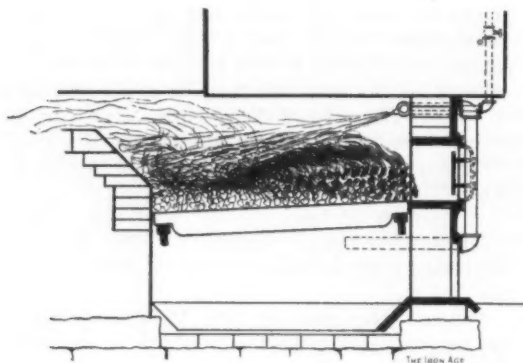


Fig. 21.—Allen's Steam Jet Furnace.

spection & Insurance Company. It was devised by J. M. Allen to meet the requests of a number of the customers of that company for a smoke suppressing device and was offered freely for their use.

It will be seen that the steam pipe, with its 1-16-inch nozzles, is placed inside of the air pipe, which has corresponding but larger and concentric nozzles opening into the fire box. One end of the air pipe is closed to the air, but receives the steam pipe, while the other end, the intake for the air, is run for some distance into the ash pit, to receive warmer air than could be obtained outside; but this inlet end is placed well over to one side of the pit, so as to be out of the way of the fireman. When the steam issues from its small jets and blows through the center of the air jet pipes into the furnace it induces a rapid flow of the air from the air pipe, on the principle of the injector, and much better results are obtained in the furnace than when simply a steam jet alone is employed.

Many variations on the devices just described have

injector. That they do decrease the amount of smoke in some cases there seems to be no doubt. Reasons which have been given to explain the action of the jet and which may to some extent be true are the following:

1. The diminution of smoke is apparent and not real. Both the air and the steam dilute the smoke, and make it less dense in appearance as it escapes from the top of the chimney. The steam also escaping from the chimney as a white cloud disguises the smoke and may condense its bulk, rendering it less visible. Further, the chilling action of the air and steam may decrease the rapidity of production of the smoke in the furnace, extending its production over a longer period of time, decreasing its density during that time.

2. The jet of air violently driven in by the steam and pointed downward on the bed of coal becomes intimately mixed with the gases distilled from the coal, and then if there is a long run through the hot combustion chamber the mixture will be burned, destroying the smoke.

The steam jet is in itself a wasteful appliance, for even if the steam is decomposed and the gases afterward completely burned, forming steam again, it escapes from the boiler superheated to the temperature of the flue gases, which temperature is always higher than that of the steam in the jet, and there is a consequent loss of heat due to the superheating.

Another objection sometimes made to the use of

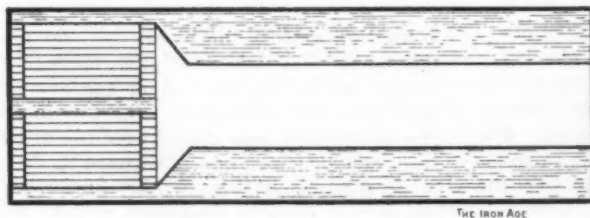


Fig. 22.—The Breeches Boiler.

been invented, some discharging their steam or steam and air from the ends of the furnace and some from the sides, but all depend upon the principles considered above. As we have seen that in a well designed furnace, not overworked, the smoke only appears just after firing, so these steam jets should be under the easy control of the fireman to allow him to use them only when they are needed, identically the same as the secondary air supply is controlled, as described in our former consideration. By thus only using the steam jets at intervals the expense attending their operation

steam jets is the constant hissing noise accompanying their use.

Double Sets of Furnaces.

Boilers equipped with more than one furnace have been designed from four different standpoints, as follows:

1. To conform to the requirements of special design in certain boilers, such as found in the Lancashire, the Galloway and in the Scotch marine boilers. Double furnaces of this class will not be considered here, as we are now interested only in furnaces designed primarily

to reduce smoke nuisance and promote economy irrespective of such restrictions as may be imposed by special forms of boiler design.

2. Double furnaces designed for the purpose of obtaining a more extended grate surface in cases where crowded conditions prevent ample area of grate being provided in a single furnace.

3. To maintain high temperatures in the combustible gases and the accompanying air, for an extended period of time, to insure perfect combustion.

4. To burn the smoke previously formed, which practice we have already seen is not in itself a profitable one.

About 1850 a double furnace boiler was invented in England, known as the breeches boiler, thus named from its fancied resemblance to a pair of trousers. This boiler is shown in Fig. 22. It contains two separate internally fired furnaces joined together at their rear end

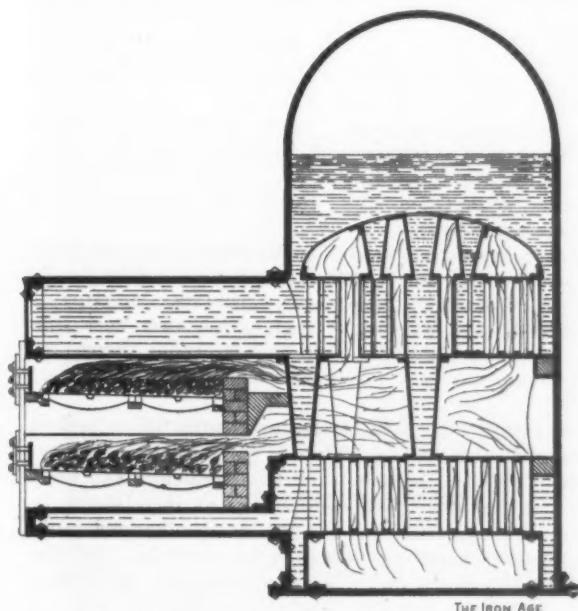


Fig. 23.—The Galloway Double Furnace Boiler.

into a common flue or combustion chamber. Each furnace is fired alternately in a manner similar to that already described under the heading of "Alternate Firing," only instead of firing into a single furnace chamber two separate fire boxes are here provided, as shown, and the spread method of firing is adopted for each furnace. With this furnace let us suppose that the coal in both fire boxes has distilled off all of its volatile matter

and an excess of air will pass through its porous bed of coke, becoming highly heated in its passage, and will then mix (in the combustion chamber) with the volatile gases distilled from the freshly charged coal, and such conditions will facilitate rapid combustion.

In Fig. 23 a double furnace boiler is shown, invented and patented by Galloway, in 1853. This shows one of Mr. Galloway's first attempts to supply vertical conical water tubes to an internally fired boiler, which application (referred more particularly to Cornish and Lancashire boilers) has given us the well-known Galloway type of boiler.

It will be seen that this arrangement, with one furnace located over the other, gives double the amount of grate surface than would be possible by any other arrangement for a given amount of floor space occupied, but the difficulty in charging coal into the two furnaces at different levels makes it somewhat objectionable.

The operation of this double furnace is practically identical to that of the breeches boiler just described, except that after obtaining a bed of incandescent coke in both furnaces, instead of firing coal first on the right and then on the left hand furnace, we begin by charging coal first in the lower furnace and then, after a proper interval, firing in the upper furnace, and thus alternating from one furnace to the other, we obtain the same results as have been described in connection with Fig. 22.

Another form of double furnace boiler is shown in Fig. 24 used in connection with a horizontal tubular boiler. The writer saw this boiler setting in the West a number of years ago operating quite successfully with a bituminous coal averaging 35 per cent. in volatile matter. I have made the drawing from memory and have, perhaps, introduced a few refinements so as to make it thoroughly practical.

The illustration shows a separate and complete furnace located with a fire arch extending over the entire combustion chamber. Over the front end of each furnace is a sliding damper, both being operated simultaneously by a single movement of outside lever rods, so that when one is opened the other is closed. Directly above each of these sliding dampers are two revolving dampers, operated by the same lever rods that operate the two sliding dampers, one revolving damper being closed as the other is opened. All four dampers are operated at once by a simple movement of either lever at either end of the boiler.

It will be seen that both damper controlling levers are connected by a light pipe connecting rod, running along one side of the furnace setting. The relative positions of all four dampers with the lever arms moved to their extreme right hand position are shown in the illustration, and it will be readily understood that when the

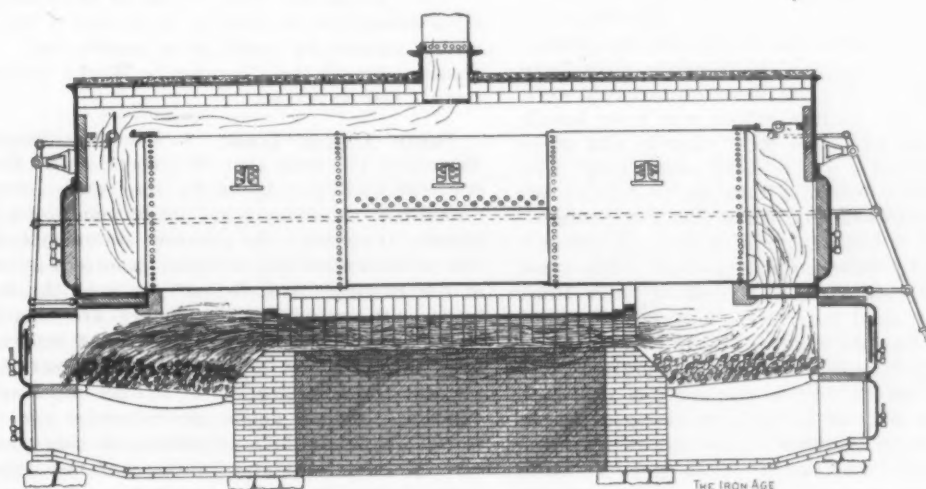


Fig. 24.—An American Double Furnace Boiler.

and we have on our grates incandescent beds of coke. We begin firing, say, into the right hand furnace. The fire bed in the left hand furnace will then maintain the high temperature desired in the combustion chamber,

lower ends of these levers are moved to their extreme left hand position the opening and closing of all these dampers will be reversed.

To operate this double furnace, let us suppose that we

have an incandescent bed of coke in both furnaces. The fireman at the right hand end of the boiler begins firing coal (by the spread method) into his furnace. The gases distilled from the fresh coal pass to the right, through the combustion chamber, burning rapidly beneath the highly heated arch, and then they pass over the incandescent coke bed of the right hand furnace, through which an excess of hot air is passing, and here a very rapid and complete final combustion of the unconsumed gases is supposed to take place.

The resulting products of combustion then pass upward through the open sliding damper at the right hand front of this furnace and next enter the fire tubes of the boiler, emerging from them at the opposite (left) end of the boiler, whence they move upward through the open revolving damper, and after passing toward the right along the space between the boiler top and its top brick covering they reach the smoke flue, which is placed above the center of the boiler, whence they pass to the chimney.

As soon as the coal charged to the left hand furnace has burned to an incandescent coke the fireman at that end of the boiler pulls the lower end of his damper lever toward the left (away from the front of the boiler), which, of course, pulls the opposite damper lever up close to the boiler front, and that serves as a signal to the other fireman (in front of the right hand furnace) to begin firing fresh coal on his fire bed, when the entire passage of the gases produced by his furnace is changed to the opposite direction of flow, and thus one furnace and then the other is alternately charged, and with properly designed proportions and with rational stoking smoke is almost completely suppressed.

For economy in operation with such an arrangement of furnaces two boiler rooms are necessitated, one at each end of the boilers. A boiler plant thus equipped should be of sufficient size to require two firemen, each one taking care of all the furnaces opening into his individual boiler room.

Central Pennsylvania News.

HARRISBURG, PA., November 8, 1902.—The Pennsylvania Steel Company, Steelton, will petition the council of that borough to annex a mile of territory south of that town in which the company are erecting a large new plant. The steel company pay large amounts of money in taxes and would rather turn that money into the Steelton treasury than that of the county, as they want Steelton capitalists to extend the town to the new works in order to give house room close to the works for the additional force of workmen to be employed. It is estimated that by the first of the year, when some of the new departments will be started, 9000 men will be on the pay rolls of the company. The directors of the steel company paid a visit to the works this week and went carefully over the new plant. No significance is attached to the visit, which was merely for the purpose of inspecting improvements. The Steelton mills have made less than one-fourth their usual output this week on account of the fuel famine, which was more keenly felt here during the past few days than at any other time since the beginning of the hard coal strike. The Bessemer department, blooming mill No. 1 and the rail mills were idle all week and have not yet resumed. The slab mill, No. 2 blooming mill and the billet mill made less than half their normal product. The blast furnaces are operating after a lay off of some time. Small amounts of hard coal have been received, but there is scarcely enough coke and soft coal on hand to keep the departments now running in operation more than three or four days. The largest order of the week was that for 9000 tons of bridge iron to be delivered to the Pennsylvania Railroad Company at intervals during the year 1903. The Pennsylvania Steel Company will furnish the Pennsylvania Railroad with a portion of their rail supply for next year.

The Central Iron & Steel Company's plants at this point were closed for two days this week for stock taking. They have resumed with orders enough on hand to keep all departments going for several months.

The Pennsylvania Railroad Company will increase

the capacity of their locomotive building shops at Juniata, near Altoona, to 500 engines per year. So far as possible the Pennsylvania Company will build all of their motive power at the Juniata and Altoona shops. Engines will be turned out there for all lines subsidiary to the Pennsylvania Company that have been acquired during the past year. These companies have for the most part been having their engines built by outside concerns. The company have given large orders to the Baldwin Works for next year for the reason that much more motive power is needed than the road's own shops can supply. The Pennsylvania Company will also erect at Altoona a plant for the construction of steel cars. Two hundred laborers are now preparing the ground for this plant, which will employ several hundred men within the next few months. Steel cars from all parts of the Pennsylvania lines will be repaired and rebuilt at this plant. A new town of 100 houses will be built outside the municipal limits to accommodate some of the workmen who will be taken to Altoona to work in the big shops.

The Susquehanna Iron & Steel Company have received at Aurora Furnace, Wrightsville, the largest consignment of ore of the year, 110 cars.

A. W. Miller, a workman in the plant of the American Steel Mfg. Company at Lebanon, has been held under \$1000 bonds on the charge of having shot Treasurer Richards of that company during the recent strike at the Lebanon works.

The Harrisburg Foundry & Machine Company have booked an order for a 250 horse-power engine to be used in the plant of the American Tobacco Company at Danville, Ky. A number of engines for New York contractors are being built and one is under course of construction for the Paxtang Electrical Company of this city.

The Harrisburg Mfg. & Boiler Works have booked orders for pipe to be shipped to Barcelona, Spain. Charles Disbrow, president of the company, has been elected to the new park commission of Harrisburg.

The new electric power plant at the Pennsylvania Steel Works, Steelton, was put in operation for the first time this week and a locomotive crane, the largest in the State, has been installed.

The Danville Rolling Mill, operated by James Mallen & Co., which has been closed for several weeks, will not resume operations until January 1 at the earliest. Inability to secure coal at reasonable prices is given as the cause for the shut down and the management announces that there will be no resumption until the fuel market again reaches a normal state. The company's nail mill, which has not been operated for several years, was dismantled last week and the shafting and other equipment sold. A small amount of stock on hand in the mill has also been placed on the market.

The Chesapeake Nail Works of Harrisburg will resume operations on Monday next after a lay off of two weeks, caused by inability to secure fuel. The other departments of the Chesapeake Works resumed operations a few days ago.

South African Trade.—A London cablegram dated November 11 states that the report of the Commissioners sent to South Africa by the South African Trade Committee to investigate trade conditions has been issued. It confirms the previous statements of the progress of American and German exporters at the expense of the British. The British yet hold the bulk of the trade, but enterprise and energy are enabling their rivals to make rapid headway. The report, speaking generally, is a new sermon on the old text of the dilatoriness and conservatism of British manufacturers and exporters, whose goods, nevertheless, are often preferred owing to their excellence of construction. The variety, cheapness and lightness of the American and German machinery are among the principal causes of its success. The engines, however, sometimes err in overlightness, resulting in collapse. The extent of the field for enterprise in one direction only can be gathered from the Commission's prediction that the Rand alone will consume in the next five years mining equipment to the value of nearly \$150,000,000.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

Temporary Framework on the New York Tower Consumed.
Footwalks a Total Wreck. Main Cables and
Tower Only Slightly Injured.

Just before five o'clock last Monday evening fire broke out in the temporary wood work on top of the New York tower of the bridge now being erected across the East River between New York and Brooklyn. On top of each tower, immediately over each leg, is a temporary timber frame or shed which had been used in the construction of the cables. These frames are built of heavy timbers, and had, during the course of the work, become saturated with oil. There was also kept on the tower material used in covering the cables, and which was of an inflammable nature. The fire completely destroyed the

flames and were compelled to let them burn themselves out.

Extent of Damage.

From a statement made by Bridge Commissioner Lindenthal to Mayor Low in regard to the origin of the fire, the damage done and the probable time of delay we take the following. This statement was made after an examination of the tower on Tuesday:

"The origin of the fire is as yet unknown. From a personal inspection which I made this morning I find that the flames found nourishment in the timber of the



View of Bridge Last Tuesday Morning.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

southern frame. All of the four cables supporting the two footwalks parted at the tower and the footwalks were totally wrecked. The condition of things on Tuesday morning is well shown by the accompanying photo-engravings, Figs. 1 to 4. Even at the Brooklyn span the footwalk cables sagged away several feet from the main ones, as indicated in Fig. 5. The present condition of the New York span is shown in Fig. 6.

The reason the footwalks did not fall in the river was because they became entangled in the suspenders which had already been hung from the cables. These, together with the bolts for supporting the roadway, had been finished, as indicated in Figs. 7 and 12, which are from photographs taken only a few days before the fire.

We may add in parenthesis that all the engravings, Figs. 7 to 14, were taken about a week before the fire, and therefore show the exact condition of the bridge when the fire occurred.

Owing to the great height of the tower the firemen could do practically nothing toward extinguishing the

scaffolding and the wooden temporary stairway in the southern half of the tower. In ascending from the bottom of the tower (where the fire started) the flames reached the wooden shed on the top, which temporarily incloses the steel wire cable bearings on the towers. In that shed had been stored the materials used in covering the cables, some of which materials are of an inflammable nature.

"The fire was hottest at the top of the southern half of the tower. It consumed all the timber, and so softened the wire ropes of the footbridge that they tore apart, and the footbridge fell. That part of the footbridge directly over the river was prevented from dropping into the river by catching on the suspender rods fastened to the main cables.

"Three of the main cables have been damaged by the fire at points near their saddles—to what extent has not yet been ascertained, but it will be less than at first supposed. It will be necessary to cut out the damaged wires—probably several hundred of them—and replace the

have an incandescent bed of coke in both furnaces. The fireman at the right hand end of the boiler begins firing coal (by the spread method) into his furnace. The gases distilled from the fresh coal pass to the right, through the combustion chamber, burning rapidly beneath the highly heated arch, and then they pass over the incandescent coke bed of the right hand furnace, through which an excess of hot air is passing, and here a very rapid and complete final combustion of the unconsumed gases is supposed to take place.

The resulting products of combustion then pass upward through the open sliding damper at the right hand front of this furnace and next enter the fire tubes of the boiler, emerging from them at the opposite (left) end of the boiler, whence they move upward through the open revolving damper, and after passing toward the right along the space between the boiler top and its top brick covering they reach the smoke flue, which is placed above the center of the boiler, whence they pass to the chimney.

As soon as the coal charged to the left hand furnace has burned to an incandescent coke the fireman at that end of the boiler pulls the lower end of his damper lever toward the left (away from the front of the boiler), which, of course, pulls the opposite damper lever up close to the boiler front, and that serves as a signal to the other fireman (in front of the right hand furnace) to begin firing fresh coal on his fire bed, when the entire passage of the gases produced by his furnace is changed to the opposite direction of flow, and thus one furnace and then the other is alternately charged, and with properly designed proportions and with rational stoking smoke is almost completely suppressed.

For economy in operation with such an arrangement of furnaces two boiler rooms are necessitated, one at each end of the boilers. A boiler plant thus equipped should be of sufficient size to require two firemen, each one taking care of all the furnaces opening into his individual boiler room.

Central Pennsylvania News.

HARRISBURG, PA., November 8, 1902.—The Pennsylvania Steel Company, Steelton, will petition the council of that borough to annex a mile of territory south of that town in which the company are erecting a large new plant. The steel company pay large amounts of money in taxes and would rather turn that money into the Steelton treasury than that of the county, as they want Steelton capitalists to extend the town to the new works in order to give house room close to the works for the additional force of workmen to be employed. It is estimated that by the first of the year, when some of the new departments will be started, 9000 men will be on the pay rolls of the company. The directors of the steel company paid a visit to the works this week and went carefully over the new plant. No significance is attached to the visit, which was merely for the purpose of inspecting improvements. The Steelton mills have made less than one-fourth their usual output this week on account of the fuel famine, which was more keenly felt here during the past few days than at any other time since the beginning of the hard coal strike. The Bessemer department, blooming mill No. 1 and the rail mills were idle all week and have not yet resumed. The slab mill, No. 2 blooming mill and the billet mill made less than half their normal product. The blast furnaces are operating after a lay off of some time. Small amounts of hard coal have been received, but there is scarcely enough coke and soft coal on hand to keep the departments now running in operation more than three or four days. The largest order of the week was that for 9000 tons of bridge iron to be delivered to the Pennsylvania Railroad Company at intervals during the year 1903. The Pennsylvania Steel Company will furnish the Pennsylvania Railroad with a portion of their rail supply for next year.

The Central Iron & Steel Company's plants at this point were closed for two days this week for stock taking. They have resumed with orders enough on hand to keep all departments going for several months.

The Pennsylvania Railroad Company will increase

the capacity of their locomotive building shops at Juniata, near Altoona, to 500 engines per year. So far as possible the Pennsylvania Company will build all of their motive power at the Juniata and Altoona shops. Engines will be turned out there for all lines subsidiary to the Pennsylvania Company that have been acquired during the past year. These companies have for the most part been having their engines built by outside concerns. The company have given large orders to the Baldwin Works for next year for the reason that much more motive power is needed than the road's own shops can supply. The Pennsylvania Company will also erect at Altoona a plant for the construction of steel cars. Two hundred laborers are now preparing the ground for this plant, which will employ several hundred men within the next few months. Steel cars from all parts of the Pennsylvania lines will be repaired and rebuilt at this plant. A new town of 100 houses will be built outside the municipal limits to accommodate some of the workmen who will be taken to Altoona to work in the big shops.

The Susquehanna Iron & Steel Company have received at Aurora Furnace, Wrightsville, the largest consignment of ore of the year, 110 cars.

A. W. Miller, a workman in the plant of the American Steel Mfg. Company at Lebanon, has been held under \$1000 bonds on the charge of having shot Treasurer Richards of that company during the recent strike at the Lebanon works.

The Harrisburg Foundry & Machine Company have booked an order for a 250 horse-power engine to be used in the plant of the American Tobacco Company at Danville, Ky. A number of engines for New York contractors are being built and one is under course of construction for the Paxtang Electrical Company of this city.

The Harrisburg Mfg. & Boiler Works have booked orders for pipe to be shipped to Barcelona, Spain. Charles Disbrow, president of the company, has been elected to the new park commission of Harrisburg.

The new electric power plant at the Pennsylvania Steel Works, Steelton, was put in operation for the first time this week and a locomotive crane, the largest in the State, has been installed.

The Danville Rolling Mill, operated by James Mallen & Co., which has been closed for several weeks, will not resume operations until January 1 at the earliest. Inability to secure coal at reasonable prices is given as the cause for the shut down and the management announces that there will be no resumption until the fuel market again reaches a normal state. The company's nail mill, which has not been operated for several years, was dismantled last week and the shafting and other equipment sold. A small amount of stock on hand in the mill has also been placed on the market.

The Chesapeake Nail Works of Harrisburg will resume operations on Monday next after a lay off of two weeks, caused by inability to secure fuel. The other departments of the Chesapeake Works resumed operations a few days ago.

South African Trade.—A London cablegram dated November 11 states that the report of the Commissioners sent to South Africa by the South African Trade Committee to investigate trade conditions has been issued. It confirms the previous statements of the progress of American and German exporters at the expense of the British. The British yet hold the bulk of the trade, but enterprise and energy are enabling their rivals to make rapid headway. The report, speaking generally, is a new sermon on the old text of the dilatoriness and conservatism of British manufacturers and exporters, whose goods, nevertheless, are often preferred owing to their excellence of construction. The variety, cheapness and lightness of the American and German machinery are among the principal causes of its success. The engines, however, sometimes err in overlightness, resulting in collapse. The extent of the field for enterprise in one direction only can be gathered from the Commission's prediction that the Rand alone will consume in the next five years mining equipment to the value of nearly \$150,000,000.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

Temporary Framework on the New York Tower Consumed. Footwalks a Total Wreck. Main Cables and Tower Only Slightly Injured.

Just before five o'clock last Monday evening fire broke out in the temporary wood work on top of the New York tower of the bridge now being erected across the East River between New York and Brooklyn. On top of each tower, immediately over each leg, is a temporary timber frame or shed which had been used in the construction of the cables. These frames are built of heavy timbers, and had, during the course of the work, become saturated with oil. There was also kept on the tower material used in covering the cables, and which was of an inflammable nature. The fire completely destroyed the

flames and were compelled to let them burn themselves out.

Extent of Damage.

From a statement made by Bridge Commissioner Lindenthal to Mayor Low in regard to the origin of the fire, the damage done and the probable time of delay we take the following. This statement was made after an examination of the tower on Tuesday:

"The origin of the fire is as yet unknown. From a personal inspection which I made this morning I find that the flames found nourishment in the timber of the



View of Bridge Last Tuesday Morning.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

southern frame. All of the four cables supporting the two footwalks parted at the tower and the footwalks were totally wrecked. The condition of things on Tuesday morning is well shown by the accompanying photo-engravings, Figs. 1 to 4. Even at the Brooklyn span the footwalk cables sagged away several feet from the main ones, as indicated in Fig. 5. The present condition of the New York span is shown in Fig. 6.

The reason the footwalks did not fall in the river was because they became entangled in the suspenders which had already been hung from the cables. These, together with the bolts for supporting the roadway, had been finished, as indicated in Figs. 7 and 12, which are from photographs taken only a few days before the fire.

We may add in parenthesis that all the engravings, Figs. 7 to 14, were taken about a week before the fire, and therefore show the exact condition of the bridge when the fire occurred.

Owing to the great height of the tower the firemen could do practically nothing toward extinguishing the

scaffolding and the wooden temporary stairway in the southern half of the tower. In ascending from the bottom of the tower (where the fire started) the flames reached the wooden shed on the top, which temporarily incloses the steel wire cable bearings on the towers. In that shed had been stored the materials used in covering the cables, some of which materials are of an inflammable nature.

"The fire was hottest at the top of the southern half of the tower. It consumed all the timber, and so softened the wire ropes of the footbridge that they tore apart, and the footbridge fell. That part of the footbridge directly over the river was prevented from dropping into the river by catching on the suspender rods fastened to the main cables.

"Three of the main cables have been damaged by the fire at points near their saddles—to what extent has not yet been ascertained, but it will be less than at first supposed. It will be necessary to cut out the damaged wires—probably several hundred of them—and replace the

same with sound wires. This work may delay the completion of the structure not to exceed 60 days.

"The bracing between the towers has been bent and warped in several places, and it will have to be straightened. A minute inspection of the damage sustained is now being made by engineers of this department. A preliminary estimate of the damage does not exceed \$50,000.

"It is almost miraculous that no lives were lost. Had the fire occurred one half hour sooner, when over 100

"The fire was of an unusual nature, and probably the first of its kind in the history of metal bridge construction."

The greatest task now confronting the contractors is not the repair of the bridge, but the clearing away of the wreckage of the footbridge. Our engravings prove that this will be a work of no mean magnitude.

Condition of Bridge at Time of Fire

At the time of the fire the cables had been finished with the exception of wrapping certain portions, and the



Fig. 2.—New York Tower and Main Span, from the River.



Fig. 3.—View Looking Toward Brooklyn.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

workmen were on the footbridges, working on the main cables, great loss of life would have been almost unavoidable.

"None of the damage will fall upon the city, which is amply protected in its contract for the work. The principal loss was sustained by the John A. Roebling Sons Company, which company have the contract for the steel wire cables.

suspenders were all in place. The wrapping was a water proof material known as durable metal, a composition of oxidized linseed oil, asphalt and varnish gum on canvas. Five feet from the fire this wrapping was intact in some places. In others the covering had burned away, but the canvas base was sound.

The method of applying this wrapping is shown in Figs. 10 and 11. The canvas strip is wound around the

cable and then pressed into close contact with a hot iron, Fig. 10. As an additional protection from the weather the cables are then covered with thin steel sheets.

Cable Making.

In our issue of May 8, 1902, we presented a very complete illustrated description of cable making on the bridge, from which we take the following:

One of the most interesting features of the work connected with the building of the new East River Bridge, uniting New York and Brooklyn, is that of cable making. That it is also a task of no small magnitude is shown by the statement that the four cables completed will weigh some 5000 tons. Each cable will be composed of 7696 wires of No. 6 gauge and having a strength of 200,000 pounds per sectional square inch. Each of these wires must be carried from anchorage to anchorage over each tower and secured to the eye bars leading into the anchorages. That an idea may be formed of

section of these brackets permits the carrier to pass over the guide pulleys and over the segment track at the top of the tower.

The operating cable extends from one anchorage to the other, and is actuated by an engine on the New York side. At the Brooklyn end, Fig. 14, this cable passes around horizontally disposed sheaves, which can be adjusted toward or from each other so as to bring the cable to the proper elevation over the main cable which it is assembling. Two strands are built simultaneously, one operating cable having two carriers, one serving one strand and one the other. One carrier brings the wire from the New York side, while the other takes it from the Brooklyn.

The first six wires entering a new strand are carefully adjusted for height by comparing them with a guide wire. After this has been done the guide wire is no longer used until needed for a new strand, the six wires

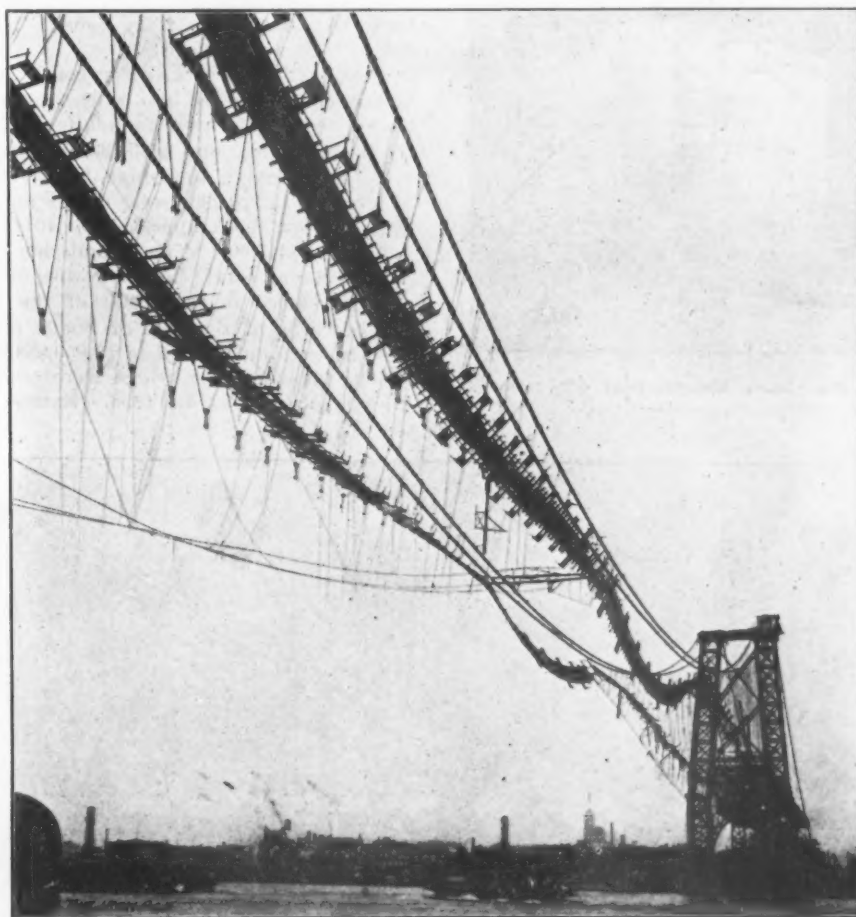


Fig. 4.—View from Beneath Bridge—New York Tower in the Distance.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

how much greater this task is than any ever before attempted of a similar character, it is only necessary to mention the dimensions of the cables of the present Brooklyn suspension bridge. Each of those cables contained 5296 wires of Nos. 7 and 8 gauge, or a total of 21,184 wires, as against 30,784. In the old bridge the four cables weighed 3588 tons.

The anchor chains, Fig. 14, consist of eye bars arranged in two groups, one over the other. These bars vary in length from 9 feet 11 1/32 inches to 14 1/2 feet, and in section from 9 x 1 1/8 inches to 9 x 2 inches. In all there are 1516 bars.

Upon entering the anchorage the two groups of chains curve downward and away from each other. The radius of the lower chain is 58 1/2 feet, and the distance apart at the lower ends is 20 feet.

A new method was introduced for stringing the wires. The wire carrier consists of a grooved pulley carried by a frame composed of three bars. At the upper end of each bar is a bracket projecting at right angles, and which is secured to the operating cable. The side pro-

serving as a guide for all the others of that particular strand. Stationed at intervals on both of the shore spans and the main span are men who signal the position of the wire and whether it should be raised or lowered. This adjusting is done by means of a block and tackle at the anchorage.

On top of each tower, just over the saddle, are two groups of sheaves. When all the wires of a strand, 208 in number, have been placed they are brought together to form a round bundle and lashed at intervals with wire. The strand is then lifted by a capstan, which is located on top of a frame directly over the sheaves just mentioned, and lowered into place on the saddle.

At each anchorage the wire passes around a cast steel shoe, which is held to the upper links of the cable chain, Fig. 14. While the shoe is receiving the wire it rests in a horizontal position. After it has received all the wires of a strand it must be turned one-quarter, or so as to stand in a vertical position. Before this can be accomplished it is necessary to relieve the eye bars, or chain, of the strain of the strand. To do this the yoke hold-

ing the shoe is attached to a heavy cable made fast in the anchorage. Between the cable and yoke is inserted a massive turnbuckle, the nut of which is provided with a long ratchet lever which is operated by the hoisting

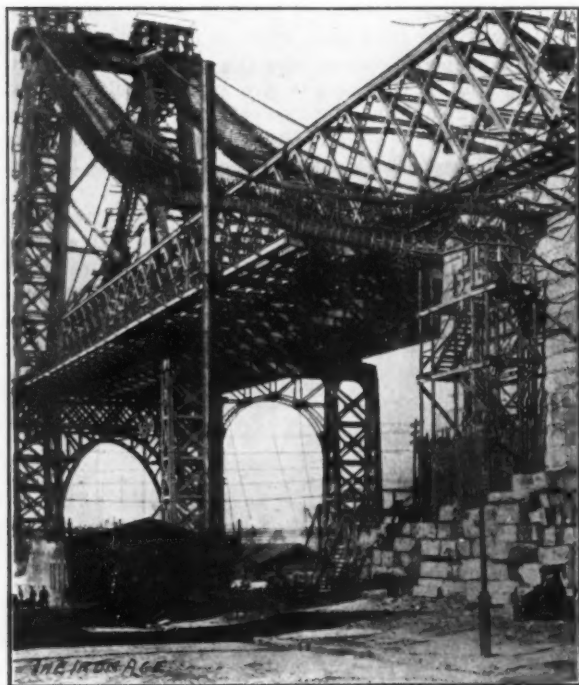


Fig. 5.—Brooklyn Shore Span, Showing Footwalks Dropped Away from Main Cables.

tracks for elevated trains, two roadways for vehicles, two footways for pedestrians and two cycle paths. The total length of the structure is 7200 feet including approaches.

The contract for the towers and the end spans, involving the manufacture and erection of about 12,000 tons of steel, was let to the New Jersey Steel & Iron Company for \$1,220,230 on February 21, 1899. The contract for the approaches was awarded on October 18, 1900, to the Pennsylvania Steel Company, they to receive \$1,464,000 for the New York approach and \$947,000 for the Brooklyn approach.

The New York anchorage rests on 3500 piles and the Brooklyn anchorage on the natural sand. Both are completed, and 1600 tons of cable anchor steel were used in each. There are about 1,500,000 feet of timber, 10,000 cubic yards of concrete and 45,000 cubic yards of stone masonry. The contract for the steel cables, &c., involving about 5000 tons of steel wire and castings, was let to the John A. Roebling Sons' Company, on December 9, 1899, for \$1,398,000.

Some of the contracts for construction which have been thus far entered into by the commission are as follows: New York tower foundations, \$373,462.71; Brooklyn tower foundations, \$485,082.75; New York anchorage, \$797,770; Brooklyn anchorage, \$771,778; steel towers and end spans, \$1,220,230; steel cables and suspenders, \$1,398,000; New York approach, \$1,464,000, and Brooklyn approach, \$947,000. The commission has acquired and paid for real estate to the value of \$1,574,608. The amount placed to the credit of the commission from the proceeds of the sale of bonds for the purpose of constructing the bridge is \$9,659,954.91.

The plans for the bridge were adopted by the commission on August 19, 1896. Extensive diamond drill



Fig. 6.—New York Shore Span.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

engine. When the cable bears all the load the shoe is turned, the hoisting engine being again called upon to perform this duty. The yoke is then passed over the eye bar pin, when the holding cable is released.

The wires are drawn in lengths of 4000 feet and over. The splices are, therefore, few and far between. The shop splice is a rolled thread, right and left, the union being a thimble similarly threaded. The splice made in the field is a cut thread.

History of the Bridge.

The bridge extends from Delancy street, New York, to South Fifth street, Brooklyn.

It is 118 feet wide, and is at the lowest position of the bridge 135 feet high. It will furnish accommodation for four surface railroad tracks, two

borings were made on both sides of the river on the sites of the tower foundations during 1896. Both piers rest on solid rock, the south pier at a depth of 66 feet below high water, and the north pier at a depth of 56 feet.

The new East River Bridge Commission was organized under the provisions of Chapter 789 of the Laws of 1895. The act was approved by the Governor on May 27, 1895. Six commissioners were appointed, three each by the mayors of New York and Brooklyn, and the two mayors act as ex-officio members of the commission.

On April 11, 1901, the first wire of the temporary foot-bridge was strung, and the first wire of the permanent cable was strung on November 29, 1901.

The chief engineer is L. L. Buck and O. F. Nichols is first assistant engineer.

Notes from Great Britain.

The Bonus System and the Workmen.

LONDON, October 18, 1902.—In *The Iron Age* of October 2 I reported that an agreement had been reached between the employers and employees in the engineering trades in regard to the bonus system. A good deal of feeling has been evinced by the men, and the agreement is by no means popular among them. The monthly report of the general secretary admits this. It says: "Many resolutions have come to hand re the bonus system. The signatories to the Carlisle original agreement have been blamed for subscribing to it without authority, and it has even been said against protests of colleagues. This is quite untrue. The simple fact is that the employers now have the right to introduce the bonus system. The Carlisle delegates have had to safeguard it with pro-

to choose between one of them. The Imperial Bank came to the rescue of the Brjansk Iron Works, whose stocks immediately began to rise at a great rate and still stand very high. Sooner or later the Kertch works, in spite of the efforts of the French financiers interested, had to go, and the crash is a serious one for Russia. The assets of the company are about 850,000 roubles and the liabilities over 18,000,000 roubles.

Australian Orders for Wagons.

The New South Wales Government is reported to have placed an order for a number of high capacity mineral trucks with the Darlington Wagon & Engineering Company. The wagons are of the double hopper coal type and have a carrying capacity of 32 tons with a tare weight of only 13 tons. They are of somewhat similar design to the wagons recently experimentally adopted on various sections of the Northeastern Railway, being nearly 40 feet long over the buffers, 9 feet high and 8 feet wide.



Fig. 7.—View of Bridge from Below, Looking Toward New York Tower.—Photographed Ten Days Before Fire.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

visions consistent with trades union principles, and this they succeeded in doing." What the men are afraid of is that their work will be speeded up beyond endurance.

Russian Industrial Troubles.

Industrial affairs in Russia are just now in a parlous condition. I hear that owing to the failure of the Kertch Metallurgical Company 5500 men are now out of employment. The Moscow correspondent of an English paper throws some interesting light upon the situation. He says:

The failure of the Kertch Metallurgical Company for well over 18,000,000 roubles has caused quite a flutter on the Russian stock markets. The largest losers will be certain French and Russo-French companies, a few Belgian houses, and three Russian companies, of which the Brjansk Iron Works are supposed to be principally involved. Practically the Russian iron works exist upon Government orders, the Russian State owning and building nearly all the railways in the empire. The connection therefore existing between the iron works and the Government is of the closest, and a very slight change of policy of the latter means enormous loss and possible ruin to the former. In the present case it appears, if report is to be believed, that the Russian Government found themselves called upon at an inconvenient time to provide a considerable material backing for several large undertakings at once. There seems to have been a certain amount of shuffling about of the stocks of the Brjansk and the Kertch companies, until finally the Minister of Finance had

Prizes for Inventive Workmen.

It is announced that the firm of Vickers Sons & Maxim are inviting the workmen at their Barrow works to communicate any ideas they might have tending to the economical production of work on which they are employed. An awards committee has been appointed to consider any such suggestions, and ten have just been dealt with. In six cases the suggestions were accepted and prizes awarded ranging from £1 to £10. I have no doubt that a £10 prize for inventing an improvement in the production of heavy metals is quite agreeable to a workman, but I should have thought that if these improvements were worth the making they were certainly worth a great deal more than £10. I cannot help thinking that a really generous inducement would bring much better results. Every manager knows that in his workshop there are necessarily a considerable number of men with inventive powers of a high order.

Some Shipbuilding Topics.

The returns for *Lloyd's Register* for the quarter ending with September show that, excluding war ships, there were 388 vessels of 1,000,714 tons gross under construction in Great Britain at the close of the quarter,

against 477 vessels of 1,414,120 tons gross at the corresponding date last year. From some particulars supplied by the well informed correspondent of the *Glasgow*

while the Germania Company pay 14½ per cent. There has been considerable activity, but the same general tendency immensely to increase the producing capacity,



Fig. 8.—Brooklyn Tower Just Before Fire.

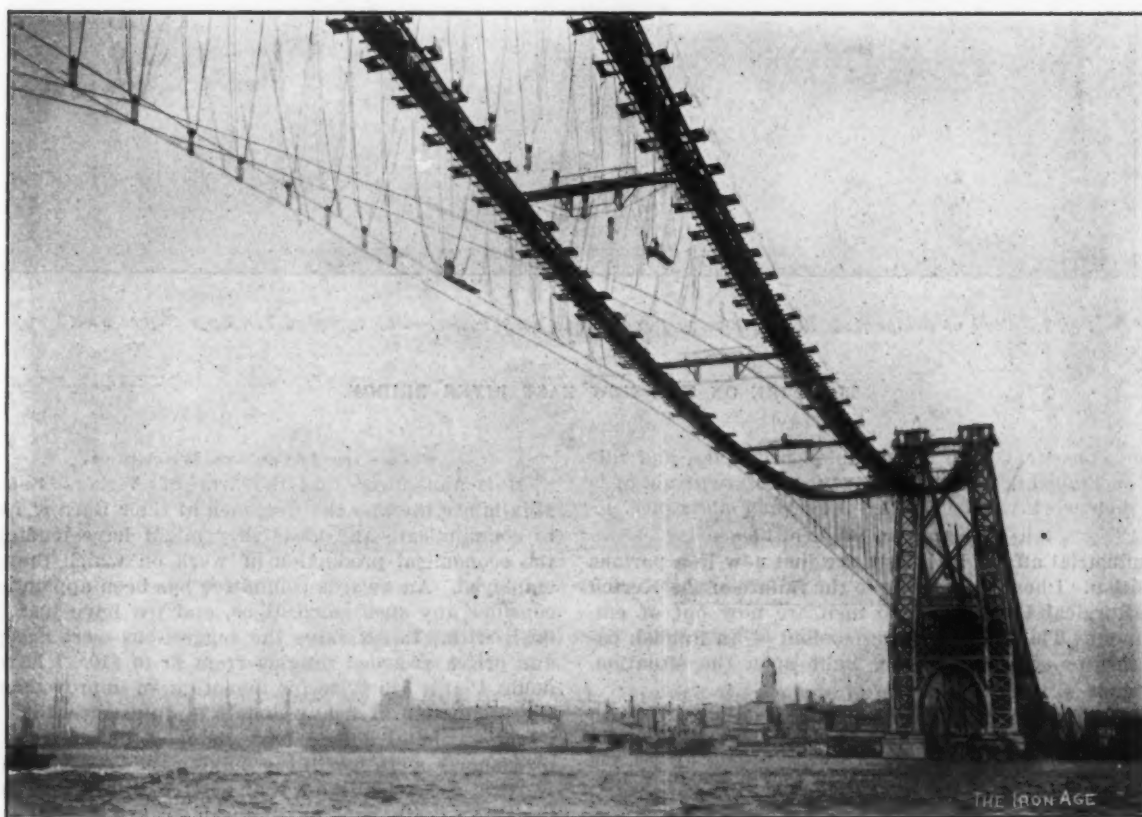


Fig. 9.—Looking Toward New York Tower Before Fire.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

Herald, I gather that the ship building companies in Germany are doing uncommonly well and paying excellent dividends, varying from 20 per cent. paid by the Techlenborg Company to 9 per cent, by Blohm & Voss,

either by the extension of works and the creation of new establishments, which has characterized other branches of industry, notably the electrical branches, has not fortunately been carried out in ship building,

which is probably a reason for the absence in this trade of the general stagnation experienced so widely in Germany.

Natural Gas in England.

LONDON, October 25, 1902.—At Heathfield, 46 miles southeast of London, natural gas is at the present moment in actual use. That it has commercial possibilities is evidenced by the fact that a company with a capital of \$500,000—the Natural Gasfields of England, Limited—are in being. In 1895, while sinking a well at

was of such an illuminating quality that it was used at Heathfield Railway Station in the same manner as ordinary coal gas, at first as naked light from fishtail burners and more recently with incandescent mantles. For a long time but little notice was taken of this, but more recently the above named company were formed and now claim to cover an area and virtually monopolize the deposits under about 300 square miles of country. It is claimed that in other bores sunk by the company the pressure reaches as high as 200 pounds to the square



Fig. 10.—Ironing Down Cable Covering.

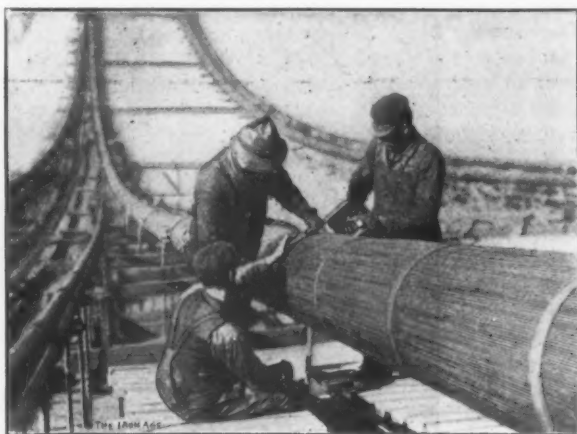


Fig. 11.—Protecting Cable with Canvas.

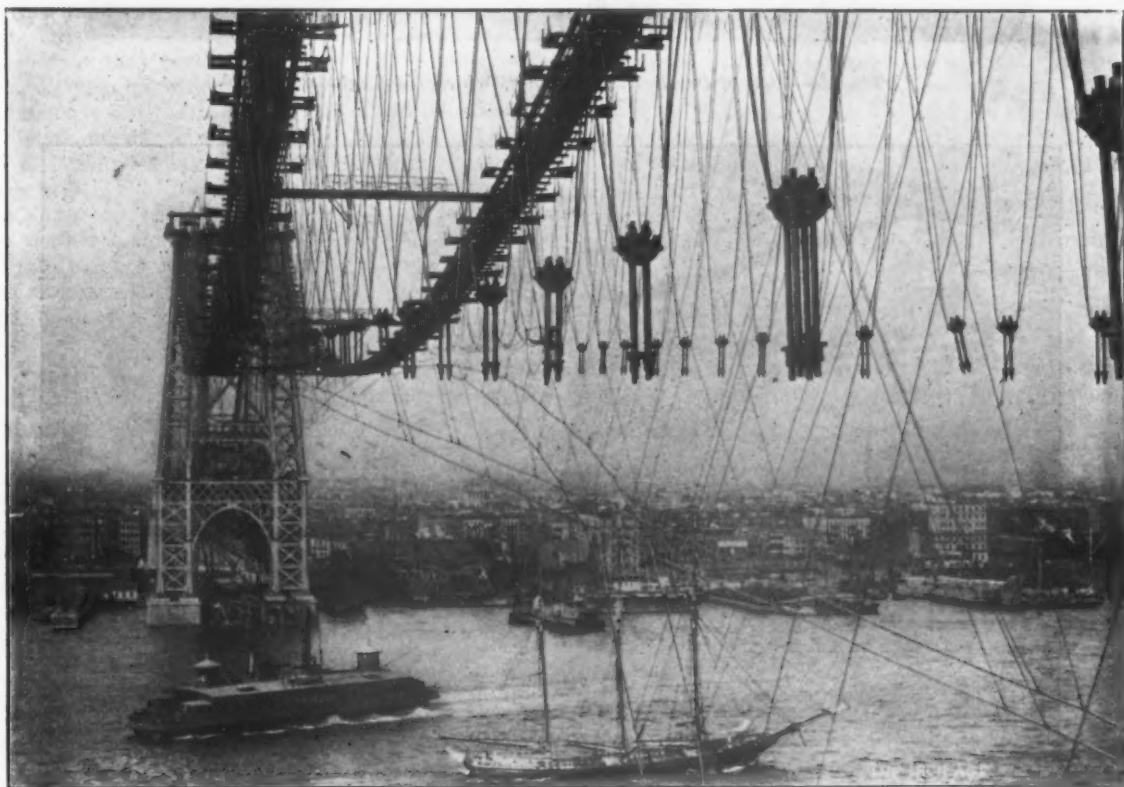


Fig. 12.—Looking Toward New York Tower Just Before Fire.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

a hotel close to the railway station at Heathfield, gas was encountered at a depth of 228 feet. Soon after, in sinking for extra water to supply the locomotive tanks at Heathfield Railway Station, a 6-inch bore hole was sunk from the bottom of the sump of the old well on the Brighton Railway Company's property and continued down to 377 feet from the surface. At 312 feet there was a perceptible gaseous odor. On applying a light to the mouth of the bore hole there was a great flare. Though the bore lining tubes are nearly all withdrawn there has remained a pressure of natural gas at 140 pounds pressure to the square inch. The gas

inch. The company are also boring at Mayfield, the next station on the Brighton Railway, about 4 miles north of Heathfield, and are to bore at Netherfield, where a discovery by the Sub-Wealden Exploration Survey was made in 1875 about 9 miles east of Heathfield. In concluding a review of the possibilities of this new discovery a writer in the *Statist* says:

Geological experts of authority express the view that the field of natural gas in Southeast England is likely to prove of similar importance to this country as have the natural gas deposits been to industry in America. If this opinion be accurate, the potentialities for the district are immense, for it is to be borne in mind that within the memory of living men Sussex was one of the

principal iron producing districts in the United Kingdom. The industry decayed, not because of the iron ore deposits giving out, but because the timber that used to be made into charcoal for dealing with the iron ore became exhausted, and the iron industry was therefore transferred to districts where iron ore and coal were found close together.

week to advance their prices, and No. 2 Belgium bars were sold at £5 2s. net at Antwerp. This movement was welcomed by the ironmasters, but even yet is much below the English price, and the consequence is that consumers still remain coy. The prevailing feature in

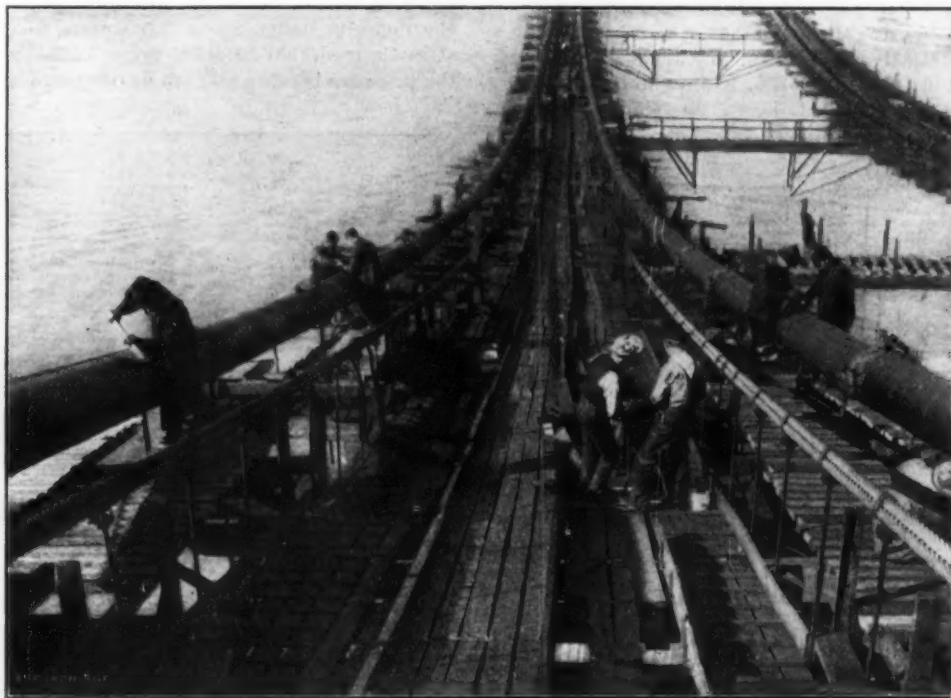


Fig. 13.—View of One Footwalk, Both of Which Were Totally Wrecked.

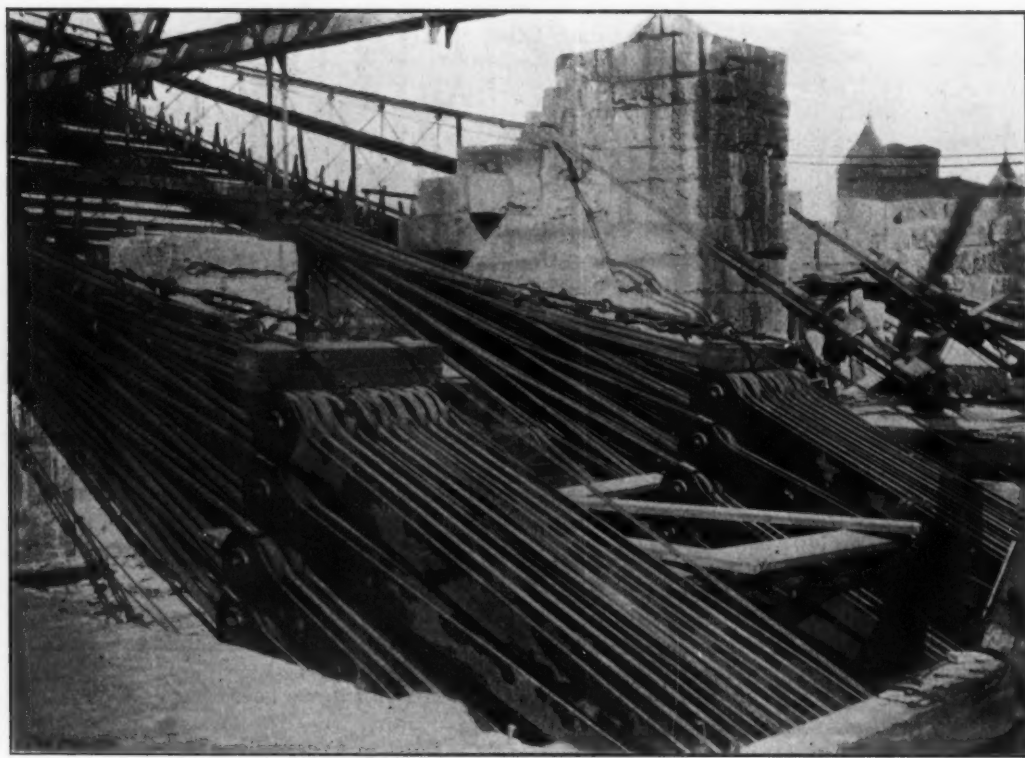


Fig. 14.—Brooklyn Anchorage, Showing Cable Wires Secured to Eye Bars.

THE FIRE ON THE NEW EAST RIVER BRIDGE.

The Markets.

As was anticipated, the settlement of the Pennsylvania coal strike has brought instant relief to the British market. Pig iron at once became easier, with the result that consumers began to buy more readily. This easier price, however, is but tentative and buyers are still holding off. The agents of Belgian and German houses received instructions in the early part of the

Glasgow is the scarcity of warrants and a large quantity are still in the hands of American agents. At the same time the shipments to America are not up to expectation, and I was therefore right in my surmise once or twice expressed in these columns that the American cry had more noise than wool in it. I repeat that American orders have had more influence in consequence of market talking than of actual shipments. In addition

recent orders from America for iron and steel have undoubtedly gone to Germany, although the Cleveland men have had a fair number of American orders for pig iron. Prices at the time of writing are as follows:

Pig Iron.—Scotch, 57 shillings; Cleveland, 51 shillings 8 pence; forge qualities, Staffordshire cinder, 50 to 51 shillings; part mine, 52 to 54 shillings; all mine, 57 shillings 6 pence to 67 shillings 6 pence; best ditto, 80 to 82 shillings 6 pence; cold blast, 95 to 100 shillings; Northamptonshire, 51 shillings 6 pence to 52 shillings 6 pence; Derbyshire, 53 to 54 shillings; North Staffordshire, 53 shillings 6 pence to 54 shillings 6 pence; Lincolnshire, 56 shillings 7 pence.

Finished Iron.—Marked bars, £8 10s.; Earl of Dudley's brand, £9 2s. 6d.; second grade, £7 10s.; common unmarked bars, £6 10s. to £6 15s.; North Staffordshire bars, £6 15s.; angles, £7 10s. to £7 15s.; sheets, singles, £7 15s. to £7 17s. 6d.; doubles, £7 17s. 6d. to £8; trebles, £8 10s. to £8 12s. 6d.; galvanized corrugated sheets, f.o.b. Liverpool, £11 7s. 6d. to £11 10s.; hoop iron, £7 5s. to £7 10s.; nail rod and rivet iron, £7 5s. to £7 10s.; gas strip, £7.

Steel.—Bessemer billets, £4 15s. to £4 17s. 6d.; Siemens billets, £5; mild steel bars, £6 10s. to £7; steel plates, £6 5s. to £6 15s.; steel girders, £6 to £6 5s.; steel angles, £5 15s. to £6 5s.

An Iron Ore Discovery.

Some time ago I announced that Kennedy Brothers of Ronhead, near Barrow, had discovered a new bed of hematite iron ore. High hopes were held out that this discovery would galvanize the furnace hematite iron industry. More recent investigations strengthen this hope. A shaft has been sunk to a depth of 60 yards and it is reported that several trial holes have been put down in its vicinity which prove not only the existence of an immense ore bearing area, but of ore of high quality and equal in richness and metallic percentage to the famous Hodbarrow ore. What is more interesting still is that this find of ore is on the south of the Duddon estuary, in direct line with the Hodbarrow pits on the north side of the estuary, and the presumption is that a large deposit of ore underlies the 2 miles of open waterway. S. G. H.

Gas Power Development.

The gas engine central station is assuming material form in several recent projects for the utilization of gas fuel for power and lighting purposes. A complete equipment of gas generators, gas engines and direct connected generators is in process of installation in several important American industrial establishments—namely, the Winchester Repeating Arms Company, New Haven, Conn.; the Atlantic Refining Company, Philadelphia, Pa.; the Consolidated Industries Company, Batavia, N. Y., and the Rockland Electric Company, Hillburn, N. Y. The first of these equipments to be put in operation will be that of the Winchester Repeating Arms Company, at New Haven. The power house has been specially designed for the new gas apparatus and the entire power for manufacturing and lighting purposes will be furnished from this point. The engines are of Westinghouse make, of the standard vertical three-cylinder single acting type, aggregating 500 horse-power. They are each direct connected to 250-volt Westinghouse direct current generators and are furnished with gas fuel from Loomis-Pettibone producer gas generators located in the adjoining producer room. Two additional engines of the vertical type are employed as auxiliaries. Suitable gas holders are provided for insurance of continuity and uniformity of fuel supply.

The power station of the Atlantic Refining Company will be equipped with a new type of Westinghouse gas engine and a type also new to American practice—namely, the horizontal, double crank, double acting engine. There will be two engines, each of 500 horse-power and each engine will be direct connected to a 350-kw. 25-cycle, 3-phase generator arranged for parallel operation. This feature is of much interest and importance at the present time and presages further development

in this branch of industrial enterprise. The engines will operate upon a rich oil gas of approximately 1200 B. T. U. per cubic foot.

The equipment of the Consolidated Industries Company is of still greater interest by reason of the arrangements for the most efficient utilization of the fuel supply. The plant will supply three products—namely, metallurgical coke, fuel gas and electricity. A special process will be used yielding metallurgical coke, with fuel gas as a by-product. The electricity for lighting and power purposes will be generated at a central power station employing 250 horse-power Westinghouse gas engines of the new horizontal double acting type direct connected to Westinghouse A. C. generators operating in parallel and supplying current at 1100 volts to the distributing network. A smaller generating unit will also be used for light loads. The installation is an instructive application of processes having for their object the utilization of waste products.

Another gas power enterprise and one capable of certain ultimate development is the Rockland Electric Company, which, together with the Ramapo Iron Works and the Ramapo Foundry Company is comprised in the Snow interests. The installation will consist of an independent gas manufacturing plant employing the Loomis-Pettibone process and a power plant containing Westinghouse direct connected gas engine generator units. The producer plant will supply water gas to the iron plants mentioned for heating and metallurgical purposes, and electric power to all industrial plants in the vicinity, including the Mahwah Branch of the Standard Brake Shoe Company, located about 4 miles distant from Hillburn. The plant will also supply current for lighting throughout the Ramapo Valley district of some 14 miles in extent comprised between the towns of Ridgewood, N. J., on the south, and Hillburn, N. Y., on the north. The gas engines installed are also of the new Westinghouse horizontal double acting type of 350 horse-power, each equipment aggregating 1200 brake horse-power, or 1400 brake horse-power maximum. The engines are direct connected to Westinghouse polyphase generators and constructed to operate in parallel. A 128 horse-power vertical gas engine unit will also be employed for carrying light loads and assisting peak loads. A small amount of direct current power will be furnished for a short time from one of the main units, which will be temporarily a direct current, but it is the intention to ultimately replace this direct current generator by an alternating current generator, thus converting the entire plant into a polyphase gas engine central station.

These four installations, and especially that at Hillburn, should prove of considerable interest to gas engineers and manufacturers in general as representative of a decided and welcome advancement in the field of power development. The machinery will in all cases be furnished and erected by Westinghouse, Church, Kerr & Co., engineers, New York.

PERSONAL

A. J. Moxham, formerly president of the Lorain Steel Company, and later general manager of the Dominion Iron & Steel Company, has settled at Wilmington, Del., where he has entered into the manufacture of powder.

John Stambaugh, Jr., secretary of the Youngstown Steel Company, Youngstown, Ohio, has returned from an extended visit to California.

A. E. Salwen, general manager of the Grängesberg Iron Company of Sweden, having next to the Gellivara Company the largest iron ore mine in Sweden, sailed from New York for Europe on the 8th inst.

H. E. Flewellin, who has been connected for ten years with the New York office of the Bethlehem Steel Company, has resigned to take a position with the Dominion Iron & Steel Company, Limited, at their works in Sydney.

Secretary John W. Young of the Allis-Chalmers Company will become manager of the company's London office. He will be succeeded as secretary by Third Vice-President Joseph H. Seaman.

on their export business. To this peculiar trade movement is largely due the fact that our exports of iron and steel manufactures keep up so well.

The reversal of the decline in exports of manufactures, which it was feared had set in with some permanence last year, is highly gratifying. If they can grow under the circumstances now prevailing, which are deemed unfavorable for the cultivation of foreign trade, it is certainly most auspicious for a great expansion, when prices in this country recede from their present high level as compared with those ruling abroad.

Peculiar Chicago Developments.

An old Spanish proverb declares in substance that it is not the geographical position, not the natural advantages possessed, but the people—their inherent qualities—that make a city or a nation great. Accepting this as true there is no need to indulge in pessimism regarding the future of Chicago, but that she is confronted by a grave danger from the sowing of unwholesome mental seed of European origin there can be no doubt. This lamentable fact has been made prominent during the week just passed by the breaking out of "strikes" among the school children; the pupils at two different schools imitating the pernicious example of the trade unions by defying the authority of the school management and refusing by concerted action to return to work until their demands are complied with.

The virulence of the strike virus with which the population have been inoculated is shown in its communication to the children. But the outbreak of the fever in its present form may serve to bring greater effort to bear against the extension of the epidemic; to bring to the popular attention the evils which lie in the indulgence of the system which, when seen in its true light, is a violent effort to defy not only mere man-made authority, but against natural law. Like other things of a pernicious character, strikes lose their heinousness by familiarity, and it is only by some such unusual outbreak that we are startled into recognizing the contagion in its true colors and are aroused from our lethargy with force enough to compel action to protect and preserve the public welfare.

The "strike" among the children, too, may be of value in showing where and how to apply the remedy. The origin and fruit of strikes must be shown clearly and fully as a part of our educational system as necessary to the moral, social and material advancement of the nation.

Europe may be startled by fear of an American invasion of her industrial state, but she is taking a potent, although unrecognized, revenge upon the United States by introducing mental weeds—the product of centuries of misgovernment and perverted social conditions—through the immigrants that mingle with the native population in increased ratio during times of prosperity like the present.

Of course, many or most of the immigrants are entirely unconscious of their disability for American life by reason of their foreign ideas; ignorance has ever been the source of trouble since the days of Adam, and probably always will be. Adults as well as children must be taught, and the most effective measure for teaching grown up children is through an intense public sentiment. Unfortunately many of our own people have fallen victims to the European labor code. Therefore must the effort be made stronger to create a wholesome sentiment against strikes and the other abuses of trade

unions. Combinations of labor may be made helpful to the units and a source of strength to the nation if purged of the poisonous sentiments with which they are surcharged.

Following the "strike" among the school children comes the announcement that the teachers of the Chicago public schools, or at least such portion of them as are members of the Chicago Teachers' Society or Federation, have decided by an overwhelming vote to affiliate with the Chicago Federation of Labor, and there can be no doubt that the Federation will welcome the teachers' accession to their ranks.

This is a woful state of affairs, as it means that "strikes" and "boycotts" and the other objectionable elements of labor unions as they are now conducted will be upheld; will be instilled into the minds of the children as right modes of action. The teachers' course is tantamount to encouraging the children now on "strike" to defy their own authority.

Whatever good may result from combination, co-operation and fraternal interest when properly and legitimately applied by the force derived from organization, it must be remembered that labor organizations or unions as they exist to-day are loaded with abuses at once harmful to themselves and to the community, and not until these abnormal growths of fallacious theories are eliminated can the labor union be—as it has the potentiality of being—an uplifting beneficent force in the community.

No lofty motive appears to have actuated the teachers in their desire to join the labor unions; on the contrary, they seemed to be moved solely by selfish motive and became an easy prey to the sophistry of an outside female advocate who after pointing out the inconveniences they might suffer from compulsory participation in "strikes" and "boycotts," dwelt upon the alluring bait that 200,000 union labor votes would be back of the teachers in their efforts to secure increased salaries. This appeal, blinding the reason, carried the day.

But closer association with the labor unions may teach the teachers; certain it is that errors loom large when we are face to face with them. It may be that the teachers have bartered their birthright—their independence of action—for a mess of pottage. The very spirit of trade unions, as they now exist, is antagonistic to capital or accumulated labor; the members, too, surrender personal freedom of contract to others, who, more frequently than not, are prejudiced and act upon faulty judgment. The tendency, too, is toward a leveling policy; individual industry and merit counting for naught. Tyranny toward unorganized workers is fostered, and the whole tendency is in the direction of coercive socialism.

It may be that the teachers, possessing more than average intelligence, coming to recognize these objectionable features, may lend their influence to correcting abuses, and thus a leavening force may have been introduced into the general mass which may be productive of much good. But it is a forlorn hope if the socialistic sentiments expressed by one of the teachers are to prevail. In accounting for the affiliation of the teachers with the labor unions, expression was given to the following:

There was a time when all the functions of the social organism were united in the home. Our complex civilization has withdrawn from the home the industrial and also the educational function. They are separated not only from the home but from each other. Rational unification and co-ordination must be along the lines of least resistance. The line of least resistance is that of harmony and co-operation among existing organizations.

Education is not all derived from books, and God forbid that the home—the bulwark of American liberty and

the cradle of morality—should have its peculiar educational functions usurped by extraneous agents.

The events of the last week in Chicago are significant and should make it evident to all employers of organized or unorganized labor that they have a responsibility and a task to perform in extending help and guidance to employees and in the proper education of the rising generation.

The Fire on the New East River Bridge.

The extent of the damage to the new East River Bridge by the fire last Monday evening is not known at this time. It will take a long and careful examination to ascertain the exact condition of the structure. Apparently the New York tower, on top of which the fire occurred, is uninjured except a few of the lighter members near the top which were warped by the heat and will have to be replaced. The main cables are intact, with the exception of a comparatively few of the outer wires; these can be removed and new ones spliced in without much trouble. We do not believe that the fire lasted long enough to do any harm except to the outside wires; the wires in the interior could not have been even warmed. It must be remembered that each cable is composed of over 7500 wires in a bundle over 18 inches in diameter, and to heat this mass of practically solid steel to a dangerous degree would require a much longer time and an infinitely hotter fire than the one that took place last Monday night. Our pictures, presented elsewhere in this issue, show that the two temporary foot paths are a total wreck, all of their supporting cables having parted at the tower. It is not probable that these will be reconstructed as the main cables have been finished and working platforms can be hung from them.

The cause of the fire is unknown. Rivet heating forges were used on the tower, but according to statements made by the workmen the fires had been properly banked. The wooden structures on the tower were saturated with oil and much inflammable material used in covering the cables was stored there, so that the fire once started had matter sufficient to feed it for a short time. The efforts of the fire department were of no avail; their apparatus is not adapted to fighting a blaze 350 feet above ground.

We now come to what we consider the most important lesson to be learned from this accident, and that is, "Is the old Brooklyn Bridge in any danger from fire?" Beneath both the approaches of that bridge are old buildings which might make an intensely hot fire. We know and appreciate the fact that New York possesses the best fire department in existence and is thoroughly equipped with the most improved apparatus. Nevertheless, the old buildings referred to are a constant menace to the bridge and under certain conditions might injure or even destroy it. Much was said upon this subject both during the construction and after the completion of the bridge, but nothing ever resulted from the efforts to remove the buildings. It certainly seems strange that a few thousand dollars' interest should stand in the way of the adequate protection of a bridge which cost millions and which has increased the value of Brooklyn property many times more than it cost.

R. E. Newton is devoting his entire time to the interests of the Newton Engineering Company of Milwaukee, Wis., recently incorporated, which is equipping a shop for structural steel work. Mr. Newton was at one time in the employ of the Keystone Bridge Works of the Carnegie Steel Company, and of the Wisconsin

Bridge & Iron Company, and for several years was structural engineer for the Boston-Montana C. C. & S. Mining Company.

Manufacturers Supporting the Drawback Bill.

WASHINGTON, D. C., November 11, 1902.—The committee of manufacturers recently organized to urge before Congress the liberalizing of the present customs drawback laws have outlined their programme in a communication which is being addressed to manufacturers throughout the country, and in which suggestions regarding reforms not covered by the so-called Lovering bill are solicited. The committee are specially desirous of learning as much as possible of the recent experience of iron and steel manufacturers in obtaining drawbacks, as it is well known that in this branch of the export business many manufacturers have been obliged to buy imported materials who have heretofore employed domestic iron and steel in filling their foreign orders.

Special emphasis is placed by the committee upon the point that manufacturers may not now be using any imported dutiable materials, but that the occasion may arise in the near future when it will be of advantage to do so. The Lovering bill would make it practicable for any manufacturer who had recently imported foreign materials to fill an export order with benefit of drawback on very short notice. In calling the attention of the trade to this matter, the committee in the communication referred to, say:

"We send you herewith a copy of a bill (H. R. 15,239), introduced in Congress during the late session by the Hon. William C. Lovering of Massachusetts, which is intended to make the recovery of duties paid on imported materials used in the manufacture of exported articles simpler and easier than under the existing drawback laws and regulations. This bill was referred by the Committee on Ways and Means to a subcommittee for the purpose of perfecting its form with a view to reporting it to the House at the coming session of Congress.

"Under the present drawback law and the regulations prescribed by the Secretary of the Treasury for carrying it into effect, a manufacturer cannot recover drawbacks to which he is entitled unless he swears that certain imported materials were actually used in producing the exported article. This requirement is very difficult, and often impossible to comply with, as like domestic and imported materials are frequently used in the production of goods intended for sale both in domestic and foreign markets, with the result that the manufacturer is unable to state whether imported or domestic materials were used in the production of any particular shipment of exported articles. The necessity for keeping goods manufactured in part from imported materials on which drawback is to be claimed, separate from those made from similar domestic materials, involves considerable trouble and expense to exporting manufacturers.

"In event of the enactment of the Lovering bill drawback would be paid in every case where the manufacturer could show that the imported dutiable materials on which a drawback was claimed had been received into his factory, and that he had exported articles made from these materials or from like materials of the same productive or effective value. This would make the collection of drawback certain even though the manufacturer was unable to swear that the imported materials which he had received into his factory were actually used in making any particular lot of his products.

"Although you may not now be using any imported dutiable materials the occasion may arise in the near future when it will be to your advantage to use foreign materials, with the benefit of drawback, in manufacturing for the export trade. You can readily see in that case the enactment of the Lovering bill would be a decided benefit to you.

"It is the intention of this committee to carry on an active movement in favor of the enactment of the bill, in order to bring the influence of the exporting manufacturers of the country to bear on their Senators and Representatives in its behalf. We believe that if the

importance of the measure is properly presented to Congress by the committee and the manufacturers interested, that its enactment at the coming session of Congress can be secured.

"We are desirous of submitting to Congress information as to the extent to which the proposed liberalization of the drawback laws is favored by the manufacturers interested, and will therefore be indebted to you if you will kindly advise us as to whether you approve of the purpose of the bill. If you have any suggestions to make in regard to further reforms in the drawback laws than those included in this bill we will be pleased to have you submit them to us."

It is expected that the committee of manufacturers will arrange for a hearing before the Ways and Means Committee early in December, at which representatives of a great variety of trades will be present. W. L. C.

Drawback Decisions

Drawback on Casks and Kegs.

On the exportation of casks and kegs of various sizes and descriptions manufactured by the Mathison Cooperage Company of Jersey City, N. J., the hoops of which were made wholly from imported hoop steel, the Treasury Department has decided that a drawback will be allowed equal in amount to the duty paid on the imported steel so used, less the legal deduction of 1 per cent. The preliminary entry must show the number of packages of each size and kind exported, designated as in the manufacturer's sworn schedule, and the number of hoops per package of each designation. The gross and net weight of each package must be marked thereon.

The drawback entry must show the total number of packages of each size and kind exported, the number, weight and dimensions of hoops on each description of package, stating length, width and gauge, together with the total weight of hoop steel, in condition as imported, used in the manufacture of the several sizes of packages, and of all packages exported. The said entry must further show, in addition to the usual averments, that the exported packages of the several kinds were manufactured of materials and in the manner set forth in the manufacturer's sworn statement and schedules, dated October 15, 1902.

Drawback on Chilled Shot.

On the exportation of chilled shot, of various sizes, manufactured by Tatham & Bros. of New York, N. Y., in the manufacture of which are used only lead, the product of imported lead ore, and type metal wholly imported, paying duty, respectively, under paragraphs 181 and 190 of the existing tariff, the two metals being so combined in all cases as to secure, practically, one uniform quality of shot, the Treasury Department has decided that a drawback will be allowed equal in amount to the duty paid on the imported materials used, less the legal deduction of 1 per cent. The preliminary entry must show the marks and numbers of the outside cases or sacks, the number and net weight of the unit packages contained therein severally, together with the net weight of shot contained in each package and in the entire shipment. The drawback entry must show the total net weight of shot exported and the percentages of lead and antimony contained therein. The percentage and weight of the imported lead used as such, and the percentage and weight of the type metal used in the manufacture of the shot, together with the percentages of lead and antimony contained in the said type metal, must also be stated in the said entry. The said entry must further show, in addition to the usual averments, that the exported merchandise was manufactured of materials and in the manner set forth in the manufacturer's sworn statement, dated September 9, 1902.

In liquidation the quantity of imported lead which may be taken as the basis for allowance of drawback may equal the quantity appearing in the exported shot, as declared in the drawback entry, but in no case shall it exceed 94 per cent. of the net weight of the said shot, officially verified. To the weight of lead used in the

manufacture, the product of imported ore, may be added 10 per cent. of such weight to compensate for loss incurred in the smelting and refining processes. The duty on the lead which shall serve as the basis of drawback shall in no case be held to have been in excess of 1½ cents per pound. Samples may be taken or sworn samples furnished, as ordered by the collector, to be submitted to the appraiser for determination of the percentages of lead and antimony contained therein.

OBITUARY.

ALAN WOOD.

The death of Alan Wood, which occurred in Philadelphia on October 31, after several years of failing health, removes from the scene of his earthly labors and successes a man who was for many years a prominent figure in the sheet iron trade. Mr. Wood was a member of the family whose name is inseparably connected with the development of the manufacture of light sheets in this country. One branch of his family attained distinction in Western Pennsylvania and the other in Eastern Pennsylvania. The subject of this sketch belonged



ALAN WOOD.

to the Eastern branch. He was born July 5, 1834, near the Delaware Iron Works, owned by his father and located about 5 miles from Wilmington. He was educated in Philadelphia, and at the age of 16 took charge of the iron works. Together with his father he made improvements in the manufacture of sheet iron, which enabled a product to be successfully turned out of a quality equal to Russia sheet iron and known as patent planished.

In 1851 Mr. Wood removed to Conshohocken, Pa., a short distance from Philadelphia, where he was instrumental in establishing the Schuylkill Iron Works, now owned by the Alan Wood Company, which under his management speedily grew into a large plant for the production of sheets. He retained charge of the works until his retirement from active business ten years ago, continuing to serve as a director of the company until his decease. In 1876 he was elected to Congress, but only served one term, as he had no liking for political life. Since his retirement he has spent his time in traveling in this country and abroad. He was a member and a former director of both the Union League and Manufacturers' clubs and a member of the Franklin Institute. He was greatly interested in charitable work, and was a yearly contributor to the University of Pennsylvania.

It is a singular coincidence that on October 30, only a few hours before Mr. Wood's death, Charles Lukens, another of the directors of the Alan Wood Company, had

passed away. Mr. Lukens was 66 years of age and had also been connected with the iron trade for most of his life.

NOTES.

JAMES SWENEY, head of the Sweney Copper & Brass Company, St. Louis, Mo., died on November 5 at his home in that city, aged 79 years. He was born at Milton, Pa., and went to St. Louis in his youth. Mr. Sweney was prominent in the business and political life of that city.

PHILO H. SKIDMORE, JR., proprietor of the Pacific Iron Works, died on November 8 at his home in Bridgeport, Conn., aged 51 years. Mr. Skidmore at one time served as a member of the Connecticut State Senate.

New Publications.

Des Ingenieurs' Taschenbuch. (The Engineers' Pocket-book.) Published by the Verein Huette. Wilhelm Ernst & Sohn, Berlin, 1902.

Many years ago the students at the Technical School at Berlin began the publication of an engineers' pocket-book as part of an enterprise which included also the issue of working drawings. What was originally a modest undertaking has now grown to be a magnificent piece of work in which a good many of the leading teachers of the German professional schools participate. It is now issued in two volumes which have far outgrown the dimensions of a pocket book, one of them consisting of 1200 closely printed pages and the other of over 850 pages. The first includes mathematics, mechanics, heat, the strength of materials, machinery parts, motive power and machinery, the second embracing surveying, buildings, water supply, sewerage, heating and ventilating, highways, bridges, ship building, railroading, the metallurgy of iron and steel, electricity and the manufacture of gas. It will be observed that nearly the whole range of engineering science and practice is covered and we need hardly add that the work is done with characteristic German thoroughness. To one familiar with the German language the work will prove of great service as reflecting the practice of the Fatherland. The equipment is admirable.

The Mineral Industry; Its Statistics, Technology and Trade, 1902. Vol. X. Published by the *Engineering and Mining Journal*, Incorporated, New York.

Under the editorship of Dr. Joseph Struthers an additional volume has been published of the "Mineral Industry," which aims to present annually the statistics, technology and trade of all the mineral and metallurgical products. The statistics in the case of a number of metals and minerals are collected directly. In others they are taken from well-known authorities, like iron and steel from the report of the American Iron and Steel Association, and like coal from the United States Geological Survey. The chapters on the technology have in the majority of instances been prepared by specialists like that on aluminum by John B. C. Kershaw; cement, by Frederick H. Lewis; slag cement, by Edwin C. Eckel; electrolytic copper refining, by Titus Ulke; blue vitriol, by Ottokar Hofmann; gold milling, by Prof. R. H. Richards; cyaniding, by J. S. C. Wells; progress in pig iron manufacture, by John Birkinbine; lead smelting, by H. O. Hofman, and zinc smelting, by W. R. Ingalls. There are monographs on metallography by Albert Sauvour, on pyritic smelting by Franklin R. Carpenter, on alloys as solutions by John A. Mathews, on liquefied carbonic acid gas by A. J. Rossi, on Wetherill magnetic concentration by H. A. J. Wilkens, on ore dressing by Professor Richards, and on power plants using gas producers and gas engines by William Kent. The volume is therefore rich in special well digested matter and contains in an exceedingly convenient form an enormous mass of statistical data.

Norton P. Otis, the chairman of the Board of Directors of the Otis Elevator Company, whose residence is at Yonkers, N. Y., has been elected to Congress on the Republican ticket from the Nineteenth Congressional district of New York.

Condition of the Shipbuilding Industry.

WASHINGTON, D. C., November 11, 1902.—The annual report of the Commissioner of Navigation, which contains much interesting information supplementing the brief statistical summary made public at the close of the fiscal year ended June 30, 1902, shows that while the finished product of our shipyards last year was less than had been anticipated, the amount of work under way in several particulars had never been surpassed. This year's record, however, will be made good chiefly by the completion of steamers which have been long under construction. During the calendar year our seaboard yards have made few important contracts for merchant steamers except for those to be used in carrying oil from Texas to our North Atlantic ports. New vessels have not been ordered to take the place on the ways of large ocean steamers, which have been launched and have been recently completed or are nearing completion. The outlook for the next 12 months' shipbuilding in the United States is not equal to the outlook a year ago. While the figures of documented vessels for the year may equal those of last year, the unfinished work, from which capital and labor derive support, is diminishing on the seaboard. This, however, is also true of the United Kingdom.

American builders of steel vessels were requested to make a return showing merchant steel vessels on July 1, 1902, under construction or under contract at their respective establishments. The Navy Department, Revenue Cutter Service and Light House Board furnished a statement of vessels building or under contract in private yards for their services on that date. The summary of these statements is given below, and is essentially complete except as to the amount of capital invested, which was not returned by certain shipyards.

Merchant and Government Construction.

	Merchant ships.	Tonnage.	Naval vessels.	Tonnage.
Union Iron Works, San Francisco...	2	9,672	11	57,435
Newport News Shipbuilding & Dry Dock Company.....	4	22,033	6	67,473
William Cramp & Sons Ship & En- gine Building Company.....	4	21,590	3	39,680
Neafie & Levy Ship & Engine Build- ing Company.....	10	2,555	5	14,161
Wm. R. Trigg Company, Richmond, Va.	5	10,019	4	5,225
Maryland Steel Company.....	2	19,600	3	1,299
Burlee Dry Dock Company, Port Richmond, Staten Island.....	7	5,050	3	1,981
Bath Iron Works.....	1	3,000	3	1,981
Morgan Bros. Company, Seattle, Wash.	2	260	2	15,678
Harlan & Hollingsworth Company..	1	871	3	1,156

Merchant Construction Only.

	Vessels.	Tonnage.
New York Shipbuilding Company, Camden, N. J.	7	60,520
Eastern Shipbuilding Company, New London, Conn.	2	42,000
Delaware River Iron Shipbuilding & Engine Works, Chester, Pa.....	2	11,502
Arthur Sewall & Co., Bath, Maine.....	2	4,250
Baltimore Shipbuilding & Dry Dock Company...	2	2,000
T. S. Marvel & Co., Newburg, N. Y.....	3	1,528
Ridsden Iron & Locomotive Works, San Francisco Cal.	2	544
John H. Diaogue & Son, Camden, N. J.....	7	5,955

Government Construction Only.

Fore River Shipbuilding & Engine Company, Weymouth, Mass.....	5	33,896
Lewis Nixon (Crescent Shipyard), Elizabeth- port, N. J.....	8	7,263
Gas Engine & Power Company and Chas. L. Sea- bury & Co., Morris Heights, N. Y.....	2	585
Petersburg Iron Works Company, Petersburg, Va.	1	495
Iowa Iron Works Company, Dubuque, Iowa....	1	346
Geo. Lawley & Son Corporation, South Boston, Mass.	2	332
Wolff & Zwicker Iron Works, Portland, Ore....	1	248
Jenks Shipbuilding Company, Port Huron, Mich.	1	700
Spedden Shipbuilding Company, Baltimore, Md.	2	390
Columbian Iron & Dry Dock Company, Balti- more, Md.....	1	165

Great Lakes.

American Shipbuilding Company, Cleveland....	29	96,369
Craig Shipbuilding Company, Toledo, Ohio....	5	16,200
Detroit Shipbuilding Company.....	3	7,568
Chicago Shipbuilding Company.....	1	3,900
Ed. J. Howard, Jeffersonville, Ind.....	1	500

No Merchant or Naval Construction.

Continental Iron Works, Brooklyn, N. Y.
Atlantic Works, East Boston, Mass.
Pusey & Jones Company, Wilmington.
Kensington Shipyard Company, Philadelphia.
Merrill-Stevens Engineering Company, Jacksonville, Fla.

There has been an increase since last year in the capital invested in steel shipbuilding, and at present fully \$70,000,000 are invested in the industry. This estimate has in view naval appropriations voted or to be voted, and is not based on the increase of shipbuilding capital due to the absorption of other enterprises or to consideration of good will, except as these matters may have been included in returns to the bureau.

The number of men employed (several establishments not reporting) is returned at 49,075. During the census year the largest number of men employed at one time is put at 42,1000. Last year at times fully 50,000 men were employed in steel shipbuilding. The number of men who will be employed in private yards during the present year will probably not be so great, even when work has begun on the new war vessels authorized at the last session of Congress.

The following table shows the number and tonnage of steel vessels under construction or under contract at the dates named, and gives a fair idea of recent conditions of steel shipbuilding in the United States:

Date.	Merchant.		Government.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.
August 15, 1900.	68	277,680	47	113,329	115	391,009
June 15, 1901.	89	355,645	71	281,148	160	636,793
July 1, 1902.	104	347,486	67	269,890	171	617,376

At the beginning of the fiscal year the following steel ocean steamers of 1000 tons or upward were under construction or contracted for:

Name or number, owner and where building.	Gross tonnage.
Foreign (Transatlantic).	
No. 5, Atlantic Transport, Camden, N. J.	13,400
No. 6, Atlantic Transport, Camden, N. J.	13,400
"Finaldn," International Navigation Company, Philadelphia	12,760
"Missouri," Atlantic Transport, Sparrow's Point, Md.	9,800
"Maine," Atlantic Transport, Sparrow's Point, Md.	9,800
No. 7, Atlantic Transport, Camden, N. J.	8,900
No. 8, Atlantic Transport, Camden, N. J.	8,900
	76,960
Foreign (Transpacific direct).	
No. 1, Great Northern Steamship Company, New London, Conn.	21,000
No. 2, Great Northern Steamship Company, New London, Conn.	21,000
	42,000
Foreign (Transpacific via Hawaii).	
"Siberia," Pacific Mail, Newport News, Va.	11,276
Coasting (Hawaii).	
"Texan," American-Hawaiian Steamship Company, Camden, N. J.	8,600
"Arizonian," American-Hawaiian Steamship Company, San Francisco.	8,600
	17,200
Coasting.	
No. 19, Standard Oil, Richmond, Va.	9,000
No. 321, New York & Texas Steamship Company, Chester, Pa.	6,250
No. 320, Ocean Steamship Company, Chester, Pa.	5,252
No. 318, Standard Oil Company, Philadelphia.	3,580
No. 44, Saginaw Steel Steamship Company (oil), Newport News, Va.	4,577
"Monroe," Old Dominion, Newport News, Va.	4,300
No. 9, J. M. Guffey Petroleum Company, Camden, N. J.	3,660
No. 319, Clyde Steamship Company, Philadelphia.	3,000
"Toledo," Pittsbuigh Oil, Toledo, Ohio.	2,500
"Francis H. Leggett," Hammond Lumber, Newport News, Va.	1,900
No. 82, Union Oil Company, San Francisco.	1,000
	48,679
Miscellaneous.	
No. 375, Lewis Luckenbach, Camden, N. J.	4,500

Two of these steamers, as indicated, have been launched and are now in operation. At least four will not be launched until after the close of the current fiscal year. Reasons for the construction of several of these large steamers in the United States have been stated in previous reports of the bureau. Last year B. N. Baker, president of the Atlantic Transport Line, stated that the contract price of Nos. 5 and 6 above—building at Camden, N. J.—sister ships of the "Minneapolis," was \$1,846,

800 each. The report of Charles H. Tweed, president of the Pacific Mail Steamship Company, shows that the cost of the "Korea" was \$1,838,486. The steamers thus compare:

	Gross tons.	Speed.	Cost.
Atlantic Transport.....	13,400	16	\$1,846,800
"Korea"	11,276	19	1,838,486

The speed guaranteed in the "Korea" contract was 18 knots, and on trial was considerably exceeded, for a short burst attaining 20 knots. The comparison is made to help fix the cost of construction of ocean steel steamers in the United States at the beginning of the century.

The recent trade tendencies of American shipbuilding, including effects of legislation, enacted or proposed, are shown by the following table of the number and tonnage of ocean steel steamers of 1000 tons or more, built and documented in the fiscal years 1901 and 1902, and building or under contract in the fiscal year 1903, with the trades for which they have been designed:

	1901.*		1902.*		1903.†	
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Foreign, transatlan- tic	1	12,700	7	76,960		
Foreign, transpacific (direct)	2	19,212	2	42,000		
Foreign, transpacific (via Hawaii)...	3	18,496	1	11,276	1	11,276
Foreign, West In- dies, Mexico, Ve- nezuela	4	17,121	3	5,353	..	.....
Coasting (Hawaii).	4	22,492	2	13,079	2	17,200
Coasting	14	37,134	12	47,095	12	48,679
Miscellaneous .....	..	.....	..	.....	1	4,500
Totals.....	25	95,242	21	108,775	25	200,615

* Vessels built and documented.
† Vessels building or under contract.

The figures for 1901 and 1902 stand for finished work. Included in the 1903 construction are at least four steamers of 26,800 tons, which will not be launched before July. Whether this year's record shall exceed last year's depends, accordingly, on whether the two Great Northern Railroad steamers, aggregating 42,000 tons, which appear for the third time on the bureau's returns of shipbuilding, will be in operation before July 1, 1903.

W. L. C.

American Bridge Company's Plans.—It is the intention of the American Bridge Company to concentrate as much as possible their bridge building operations at Ambridge, near Economy, Pa., on the line of the Pittsburgh, Fort Wayne & Chicago Railroad. It will be recalled that the American Bridge have under erection at this place a large new brige plant, which was described in *The Iron Age* some months since. It is now announced that it is the intention to remove the Walker Works from Homestead to Ambridge as soon as possible. The Walker Works were built by the Shiffler Bridge Company, at Homestead, Pa., a short time before the formation of the American Bridge Company. The plant was named after the president of the Shiffler Bridge Company, and covers a tract of 9 acres and has a capacity for fabricating over 2000 tons of structural material a month. The ground now occupied by the Walker Works at Homestead has been sold to the Mesta Machine Company, who will utilize it for large additions to their plant. It will probably be some time before the plant is removed from Homestead to Ambridge, but it is the intention to remove it as soon as possible. It is also likely that the Schultz Works at McKees Rocks, the Shiffler Works, the Pittsburgh Works and the Keystone Works, all in Pittsburgh, will be removed in time to Ambridge. It is the intention to ultimately have facilities at Ambridge for fabricating about 25,000 tons of material a month. This is a much larger capacity than all the works in the Pittsburgh district owned by the American Bridge Company have at the present time.

Members of the Engineers' Society of Western Pennsylvania, with headquarters in Pittsburgh, expect to visit this week the plant of the Westinghouse Electric & Mfg. Company, at East Pittsburgh, to inspect some of the heavy work that is being turned out by this concern, and particularly the modern methods of using portable machine tools on heavy castings.

The Steel Billet Ruling Sustained.

The Board of United States General Appraisers on the 7th inst. affirmed the action of General Appraiser Jewell in the steel billet protest cast of A. Milne & Co., Naylor & Co. and George B. Douglas. The merchandise was entered at about 76 marks per 1000 kilos, advanced to about 97 marks by the customs authorities at Philadelphia, and appraised by Colonel Jewell at 86 marks. When the case was pending before the general appraiser the importers took the ground that the correct value of the billets, upon which duty should be assessed and at which they should be entered, was the price they actually paid for export in the open market. This price was far below the value fixed by the Philadelphia Collector, who contended that the domestic or home market price in Germany should govern and not the wholesale or export price. His action, had it been fully sustained, would have increased the duty from three-tenths of a cent a pound to four-tenths. General Appraiser Jewell's decision left the duty at the three-tenths rate, but accepted the home market price in Germany as the correct valuation. The importers dispute, and it may be said, still question the correctness of the ruling on this last point, and also do not understand how the value of 86 marks was reached in view of testimony officially corroborated that even the home market value was somewhat less than that. The following statement has been made, which has the appearance of being official:

"The testimony before the Board tended to show that the selling price to the consumers in the principal markets of Germany was more than the price for export. Following the decision of the Supreme Court in the *Pasavant* case, the Board felt constrained to appraise the merchandise at its home market value, without regard to the price at which it was sold to purchasers. The decision of the Board will not work any serious harm to importers in this country, inasmuch as the appraised value does not carry the merchandise over the dividing line between the higher and lower specific duties provided for this class of merchandise in the tariff, which was the case in original appraisement by the local appraiser in Philadelphia. Under the law the Board have no discretionary rights, but are compelled to appraise the merchandise at its wholesale market value in the country of exportation. The Board were unanimously of the opinion that the steel billets in question were honestly invoiced at the prices actually paid therefor, but inasmuch as the German makers fixed the value for export less than for home consumption, they were compelled to appraise it at the higher price paid by the purchasers in Germany."

The official appraisement by the Board was as follows:

Steel billets, steel slabs, steel blooms and bars, from Gebrüder Stumm, Suren, Hartmann & Co., Rombacher Huttenwerke, Dominion Iron & Steel Company, Limited, Neunkirchen, August 11.; Antwerp, August 18 and September 2.; Rombach, August 19 and September 11.; Sidney, September 11.; Differdingen, September 17, 1902, and from Union A. G. für Bergbau Eisen Dortmund, September 1, 1902:

Soft steel billets, 2-inch, and 15-20 inches long, entered at 71.50, advanced to 81.50 marks per 1000 kilos.

Steel billets, 1½-inch, 15-20 inches long, entered at 81.36, advanced to 91.36 marks per 1000 kilos.

Basic Bessemer steel slabs, 14 x 2 inches, entered at 75.36, advanced to 86.36 marks per 1000 kilos.

Siemens-Martin steel blooms, entered at 93 marks per 1015 kilos; no advance.

Steel billets, entered at \$20 per ton of 2240 pounds; no advance.

Steel sheet bars, entered at 92.60 marks per 1000 kilos; no advance.

Steel slabs, entered at 68 marks, advanced to 78 marks per 1000 kilos.

Steel blooms and billets, entered at 74, advanced to 84 marks per 1000 kilos.

The decision would perhaps be accepted as a finality but for the fact that the advances in values made by the appraisers subject the importers to a penal duty, which is a substantial addition to the cost of the steel. The importers are protected in their selling contracts by a duty clause, so that the amount of the penal duty will be paid by their customers. In behalf of these customers, therefore, they will probably appeal to the courts.

So far as additional importations are concerned the course is now made plain. As long as German billets are not valued in the home market at over 92.627 marks they will be imported under the 0.3 cent duty.

Trade Publications.

Supplies.—The Strong Machinery & Supply Company, 2½ Murray street, New York, are sending to the trade leaflets exploiting their rubber sheet packing, called Dichtungsgummi and Strong's Tisafine Wipers. A sample of the latter material is being inclosed with the leaflets.

Sheet Steel Specialties.—An interesting booklet has just been issued by the Berger Mfg. Company, Canton, Ohio, exploiting their Multiplex and other specialties. Multiplex plate is an ingeniously corrugated sheet steel which has great strength and resistance power. It is made from black or galvanized sheet steel, and is used in the construction of fire proof floors and roofs and as support for concrete work. It is made in various gauges from Nos. 16 to 24. The plate is formed to a shape resembling a number of hollow beams connected to each other. The alternate hollow spaces are filled with concrete, giving concrete beams incased in steel. One of the illustrations shows a test made at Canton, in which a piece of Multiplex plate of No. 18 gauge covering an area 6 x 4 feet and supported by steel I beams sustained a bearing pressure of 51,292 pounds, or 2137 pounds per square foot. Other specialties shown in the leaflet are the Economy studs, angles, furring strips and sockets, as well as fire proof partitions, ceiling and wall furring and luminous sidewalk lights. The phrase "A difference in material constitutes a material difference," is run in red ink above the text of each page. The booklet is well printed, and a series of neat engravings show the application of the various specialties.

Drill Press.—The Power & Speed Regulating Mfg. Company, Limited, of Kalamazoo, Mich., are distributing folders setting forth the merits claimed for the White drill press and the White variable speed countershaft or power transmitter. The following are some of the advantages claimed for the drill press: It has the belt and cone pulley drive. Its variation in speed may be taken at any point between the two extremes at which the machine is designed to run, and is designed to meet the requirements of the different size drills, which indicate the capacity of the machine. Its automatic speed indicator always registers the speed at which the machine is running. The operator is not required to touch the belt with his hands. The adjustable spring regulation of the belt tension in these machines makes it possible to regulate their sensitive quality or carrying capacity, to conform to the requirements of different classes of work. In style D of their speed power transmitters the power is transmitted between two shafts having a common axis. Concerning their mechanical speed regulator, it is claimed that its spring regulated belt tension acts as a governor in the operation of machinery, but when used to operate or control any kind of wood or iron working machine its speed, cut or feed may be regulated without in any way interfering with the regular operation of the machine.

Tin Plate.—McClure & Co., manufacturers of tin plate, 211-215 Second avenue, Pittsburgh, Pa., with branch office and warehouse in Philadelphia and mills at Washington, Pa., are sending out to the trade circulars relating to their Glenmore Old Style brand roofing tin. It contains about 25 pounds of coating to the box, 20 x 28, 112 sheets. They have also circulars relating to their Americus Redipped brand of roofing tin, regarding which they state that each sheet is dipped by hand in open pots and that each sheet is stamped with brand and thickness, pure palm oil only being used as a flux. Their Badger Old Style brand of roofing tin carries about 20 pounds of coating to the box, 20 x 28, 112 sheets. This concern own and operate a very complete tin plate plant at Washington, Pa., known as the Charcoal Iron Tin Mills, with a weekly capacity of about 2500 boxes of tin andterne plates.

More Steel Car Suits.—At Pittsburgh suit has been entered in the United States Circuit Court by the Morton Trust Company and the Pressed Steel Car Company against the Standard Steel Car Company for \$100,000 damages for infringement of patents. The Morton Trust Company are a corporation of New York, having an assigned interest in the Schoen patents as collateral security for a loan. A representative of the Standard Steel Car Company states that this action is similar to other suits instituted by the same concerns, and that it will be shown when the suits are tried that the Standard Steel Car Company have not infringed on any of the patents of the plaintiffs.

MANUFACTURING.

Iron and Steel.

The Colonial Steel Company, Keystone Building, Pittsburgh, with works at Monaca, Pa., have recently added two 24-pot crucible steel melting furnaces to their equipment, which will increase their capacity 50 per cent. They are now operating six 24-pot furnaces and in about six weeks expect to have on two more of the same size, which will give a total increased production of 100 per cent. This company have had a very large demand for their Colonial special steels which has made large additions to their melting capacity imperative. They recently bought 10 acres more of ground adjacent to their plant, which will be used at some time for further extensions to existing works.

The new sheet mills of the Sharon Steel Company, at Sharon, Pa., are rapidly being completed and will probably be started about January 1. The heating furnaces have been finished and the engine equipment is about ready. The new plant will turn out about 150 tons of sheets per day.

The long period of idleness of Indiana tin plate workers was broken Monday when 20 of the 28 mills of the American Tin Plate Company at Elwood, Ind., started up. The six mills left idle are being repaired. The bar mill was started on Saturday. The company's plants at Anderson, Gas City and Middleton, it is said, will open some time during the month. At the four Indiana cities the American Tin Plate Company have 47 mills, giving employment to 3100 men. The Middleton plant makes black plate exclusively. As natural gas is not in adequate supply during the coldest part of the winter arrangements are made for using coal at the different plants when the emergency requires. Building operations continue on the independent plant at Atlanta, Ind., which was promoted by the citizens of that town when the American Tin Plate Company closed their mills there. Another independent plant is being built at Greencastle, Ind.

Elk Rapids Furnace, Mich., will be blown in about December 15.

Zenith Furnace, West Duluth, Minn., blew out October 10.

Jefferson Furnace, Texas, will go in blast about December 1.

Mabel Furnace, Sharpsville, Pa., was blown in October 16.

South Chicago Furnace, Ill., was blown out October 30.

The Ritter-Conley Mfg. Company of Pittsburgh have the contract for the erection of two blast furnaces for the Buffalo & Susquehanna Iron Company, to be erected at Stoney Point, near Buffalo, N. Y. Each of the furnaces will be 90 feet high and 22 feet in diameter at the bosh, and each will have a daily capacity of about 600 tons. Julian Kennedy of Pittsburgh is consulting engineer for the building of these furnaces and it is probable his brother, Hugh Kennedy, will be superintendent.

The Youngstown Iron Sheet & Tube Company, Youngstown, Ohio, and Pickands, Mather & Co. of Cleveland have bought jointly 6000 acres of coal lands in West Virginia. It is the intention to erect a large number of coke ovens on the property and the output of coke will be used at the blast furnaces of the Youngstown Iron Sheet & Tube Company and also by Pickands, Mather & Co. The Youngstown Iron Sheet & Tube Company are going ahead with the erection of an open hearth steel plant, for which S. V. Huber & Co. of Pittsburgh have drawn plans. Most of the grading has been done and active work on the buildings and equipment will be started in a short time.

It is understood that plans have about been completed for the remodeling and rebuilding of the National Works of the National Tube Company at McKeesport, Pa. It is understood that this large plant will be practically rebuilt and a great deal of new and modern machinery for the economical production of pipe will be installed.

The Demmler Works of the American Tin Plate Company, at Demmler, Pa., have been closed down in all departments.

No. 2 Furnace of the Dunbar Furnace Company, at Dunbar, Pa., has been blown in, after being relined and overhauled. The stack is expected to make from 250 to 300 tons a day. No. 1 Furnace has been blown out for relining and repairs.

General Machinery.

The Oshkosh Machine Company, Oshkosh, Wis., have been organized by Victor Adams, Chas. Dauber and Victor Pope. All incorporators are practical mechanics and the shop, while small, is to be well equipped. Attention will first be given to repair work and the plant enlarged as business develops.

The Spring Steel Wire & Fence Company's buildings at Anderson, Ind., have been purchased by the Hill Tool Company, the former company moving into new quarters at Brown street and the Midland Railroad.

The Helwig Mfg. Company, St. Paul, Minn., advise us that the demand for their pneumatic reversible end spindle drills, central spindle drills and pneumatic stay bolt clippers has been so great that they have been scarcely able to fill the orders with their present facilities. They are now arranging for a much larger plant that they may be able to fill orders more promptly.

The Silver Bow Foundry & Machine Company have moved from Butte, Mont., to Salt Lake City, Utah, where they are equipping a new plant. The company will be incorporated under the name of the Salt Lake Engineering Works. The machinery for the new plant has been purchased from McDowell, Stocker & Co. and Manning, Maxwell & Moore of Chicago, the Reeves Pulley Company, Columbus, Ind., and others.

The Carthage Sand Machine Company, Carthage, Mo., recently incorporated for the manufacture of a patented device for feeding abrasive material automatically to the sand feed in sawing stone, have leased the patent rights to the Pittsburgh Crushed Steel Company of Pittsburgh, who will probably have the machine made in Carthage for the present by one of the local machine shops. The machine is in use and has been adopted by many of the quarries in Missouri, by the Cleveland Stone Company and other companies in Ohio, and is being introduced elsewhere. Curtis Wright, Jr., is secretary and treasurer.

A large amount of machinery will be required by the Orient Coal & Coke Company of Pittsburgh, recently organized and whose proposed plant is described in another column. Julian Kennedy, the well-known engineer of Pittsburgh, is interested.

The Chicago Pneumatic Tool Company, Chicago, Ill., report large sales of pneumatic tools within the last week, as follows: Union Pacific Railway Company, Omaha, Neb.; Newport News Shipbuilding & Dry Dock Company, Newport News, Va.; United States Navy Yard, Brooklyn, N. Y.; Maryland Steel Company, Sparrow's Point, Md.; International & Great Northern Railway, Palestine, Texas; Standard Oil Company, Buffalo, N. Y.; American Locomotive Company, Brooks Works, Dunkirk, N. Y.; Baldwin Locomotive Works, Philadelphia, Pa.; Seattle, Tacoma & Interurban Railway, Seattle, Wash.; Chicago, Burlington & Quincy Railway, at their Galesburg, Ill., West Burlington, Iowa, and Aurora, Ill., shops; J. I. Case Threshing Machine Company, Racine, Wis., and New York Central & Hudson River Railroad, Depew, N. Y.

The Ransom Mfg. Company, Oshkosh, Wis., report that the volume of business during the month of October, 1902, was much larger than for the corresponding month last year. They now report that they are experiencing no difficulty in obtaining raw material and have orders enough on hand to keep the plant in active operation for some time. They consider the outlook for the future bright.

The Union Iron Works, Minneapolis, Minn., have a contract to build a saw mill at Winona, Minn., near Ely, to cost \$50,000. The plant will have a capacity of 90,000 feet per ten hours. The mill will be of the double cutting band type—that is, a board will be cut at both forward and backward run of the log. The equipment will be of the latest improved machinery for rapid and economical manufacture of lumber. Work will be commenced at once and it is expected that the mill will be sawing early in the spring.

The International Harvester Company have taken out permits for a number of buildings to be erected at 106th street and Torrence avenue, Chicago. The buildings comprise two one-story mills, one 360 x 80 feet and the other 220 x 30 feet, which will cost about \$10,000; a machine shop, 243 x 65 feet, to cost \$6000, and a two-story office building, 43 x 79 feet, which it is estimated will cost \$10,000. T. H. Brooks, engineer for the Deering branch of the company, prepared the plans for the mills and machine shop, and the office building was designed by Ernest Woodyatt.

H. G. Barr has succeeded H. G. Barr & Co., Worcester, Mass., and recently moved the business into larger quarters, and is now in a much better position to take care of the trade. We are advised that he has in stock all kinds of sensitive drills, universal tool room grinders and automatic screw slotters of his own design, and is prepared to build special machinery to order. The proprietor, who has had 27 years' experience in designing and building machine tools, is prepared to estimate on single machines or large lots.

The National Machinery Company, Tiffin, Ohio, have just completed an order for 300 wire nail machines for the Colorado Fuel & Iron Company. Other orders, amounting to over 250 machines, have been filled, and the company are highly gratified with the prospects as well as year's business in the wire nail machine trade.

The Westinghouse Electric & Mfg. Company of Pittsburgh have secured an order from the United States Coal Company of Dillonvale, Ohio, for two 120-kw. 550-volt direct current generators and two 10-ton mining locomotives. The United States Coal Company propose to use electric power for their locomotives and other mining machinery. The Westinghouse Company have also received an order from the Sherwin Williams Paint Company of Cleveland, Ohio, for their Cleveland works for three alternating current generators of 150 kw., 120 kw. and 75 kw. capacity, respectively, and about 500 horse-power in induction motors, which will be used to drive all their paint and varnish making machinery. They have also equipped their Newark, N. J., works with one 75-kw. alternating current engine type generator and a number of other motors, and are about to install a duplicate plant at the same works. At Pullman, Ill., they are putting in a 120-kw. alternating current generator and one of 100 kw., and about 200 horse-power in induction motors.

William Wharton, Jr., & Co., Incorporated, Philadelphia, Pa., have begun operations on an addition to their machine shops at Twenty-fifth street and Washington avenue, in that city. The addition will be one story in height and 20 x 216 feet in size.

The Oil Well Supply Company of Pittsburgh will soon start their new plant at Oil City, Pa., which has been under erection for some months. When the new plant is started their other two works at Oil City will be abandoned.

The Steam & Electrical Equipment Company of Pittsburgh report for the past week the following sales: One 300-kw. General Electric street railway generator, one 16 x 30 x 42 Wetherill tandem compound Corliss engine, one 72 x 16 steam boiler and one 24 x 42 Wright Corliss engine. They desire to call special attention to the line of Cosmopolitan steam condensers for which they are agents. They will mail catalogue to interested parties and will show how they are operating plants with the consumption of less water running condensing than was formerly required to run engines noncondensing.

Boilers, Engines, &c.

The William Tod Company, engineers, founders and machinists, Youngstown, Ohio, have recently received an order from Buffalo for a pair of 54 x 66 inch reversing engines for driving a rolling mill. They also have on hand orders for two more pairs of engines of this size, one for the Republic Iron & Steel Company and one for the Youngstown Iron Sheet & Tube Company. These are among the largest engines ever built for this purpose.

The Atlas Engine Works, Indianapolis, Ind., have arranged for the construction of a brick building which will be used as a storeroom and sheet iron shop. The estimated cost will be \$25,000. The recent improvements and rearrangements of the railroad switches to the company's yards will enable them to handle their rapidly growing business with greater facility and probably will be followed by additional new buildings.

Smalley Bros. & Co., Limited, Bay City, Mich., manufacturers of marine gasoline engines, is the name under which the business previously transacted by Smalley Bros. & Co. will hereafter be conducted. The change in the style of the firm was a step toward increasing the capital stock of the company and to facilitate the distribution of the estate of D. C. Smalley, deceased.

The municipality of Forsyth, Ga., have purchased a 186 horse-power engine from the Harrisburg Foundry & Machine Works, Harrisburg, Pa., and a 120-kw. dynamo from the General Electric Company.

The McIlvain & Spiegel Boiler & Tank Company, Cincinnati, Ohio, have acquired additional ground and will remodel their plant, reconstructing the buildings and installing new equipment. All contracts have been awarded and work is expected to be completed by March. The Skinner Engine Company, Erie, Pa., will furnish the engine; the General Electric Company, Schenectady, N. Y., the generator, and the Cincinnati Motor Company, Cincinnati, Ohio, the motors.

The S. Howes Company, Silver Creek, N. Y., manufacturers of grain cleaning machinery, special machines, &c., are installing a complete new power plant, including a Corliss engine and large boiler.

A company with \$60,000 capital stock, promoted by the Toledo Chamber of Commerce, will shortly be incorporated to manufacture the Fisher rotary steam pump and several patented devices for use in connection with power plants. The company will absorb a machine shop located at Wyandotte, Mich., and the equipment will be brought to Toledo, where a factory will be erected. J. Fisher, formerly of Denver, Col., the inventor of the devices to be manufactured, is at present purchasing additional machinery to commence the production of the goods on a large scale.

J. B. Perkins, electrical engineer, Toledo, Ohio, has completed plans for the power house of the Cleveland, Painesville & Ashtabula Electric Railway to be erected at Painesville, Ohio. The plant will be a large one of the alternating current type and several substations will be included in the equipment.

Among the recent orders received by the Welmer Machine Works Company of Lebanon, Pa., are the following: Sheffield Coal & Iron Company, Sheffield, Ala., hot blast, cold blast and burner valves for the six hot blast stoves; Globe Iron Company, Jackson, Ohio, 42 x 84 x 60 blowing engine, second order; She-nango Furnace Company, Sharpsville, Pa., 50 x 96 x 60 blowing engine. They are also installing a blowing engine 42 x 84 x 60 at the La Belle Iron Works, Steubenville, Ohio, and expect to install another in December.

Foundries.

The Hecla Iron Works, Chicago, have been incorporated, with a capital of \$50,000, to do a general foundry and iron manufacturing business. The incorporators are Frederic B. Johnston, E. D. Frazer and Thomas G. Vent.

A new foundry and machine shop has been constructed at Seattle, Wash., by J. Cornthwaite of the West Coast Iron Works. The new plant is now in operation.

The Old Colony Foundry Company, East Bridgewater, Mass., have about completed an addition, 40 x 80 feet, to their plant.

Amos W. Whitely of the Whitely Malleable Castings Company of Muncie, Ind., says that the report that his company are to go into the malleable combination is pure fabrication.

The Fountain City Drill Company, La Crosse, Wis., have recently completed improvements which have doubled the size of their foundry. The new building was made necessary by the rapid growth of the business.

The Mason Heater Company, Bellaire, Ohio, manufacturers of the Mason all cast combination heater, are erecting a new foundry, but have been delayed in getting it started by reason of scarcity of material. They have plans for another building, 100 x 110 feet, which, however, they will not commence until some time next year. They are having a very large demand for their combination heater and an increase in facilities for turning out these heaters has become imperative.

Perry, Hill & Mahan is the name of a new foundry firm organized with a capital of \$9000 and who have purchased the foundry supplies of the Star Mfg. Company of Pendleton, Ind. Mr. Perry is foreman of the Wooley Foundry, Indianapolis, where the new firm will locate, and Mr. Hill and Mr. Mahan are respectively superintendent and foreman of the Hill Foundry Company of Anderson.

Bridges and Buildings.

The Joliet Bridge & Iron Company, Joliet, Ill., have been awarded the contract for building an iron bridge at Joliet, the contract price being \$12,541.50. The bridge will be of 150 feet span, with 30 feet clear roadway and 2 feet 6 inch sidewalks, and is designed to carry street car traffic.

Fires.

The factory of the George McArthur Foundry & Machine Company of Findlay, Ohio, was almost totally destroyed by fire November 2, involving a loss of about \$12,000, about one-half insured. Twenty-five men were thrown out of employment. The shops will be rebuilt at once.

The machine shop of the Humphrey Mfg. Company, Mansfield, Ohio, was damaged by fire on November 1, entailing a loss of about \$20,000, fully covered by insurance.

Chapmann & Dewey's box factory, at Jonesboro, Ark., was destroyed by fire November 8. The loss is over \$100,000.

As the result of a fire in Camden, N. J., November 8 the plants of the Camden Mfg. Company, Nonpareil Cork Mfg. Company and the McAndrews & Forbes Licorice Company were destroyed. The total loss is close to \$1,000,000.

One of the pumping stations of Brooklyn's water supply system on the Shore road, in Queens Borough, was destroyed by the explosion of one of the boilers.

Hoffman & Shelton's underwear factory, at Williamstown, Pa., was destroyed by fire November 7. The loss is about \$40,000.

The plant of the Keystone Drilling Company, at Beaver Falls, Pa., manufacturers of drilling machinery of all kinds, was completely destroyed by fire on Sunday, November 9. It is probable the plant will be rebuilt at Beaver Falls on a much larger scale.

The stove foundry of John White & Son, Memphis, Tenn., was destroyed by fire October 31, entailing a loss of about \$10,000.

The saw mill of the American Car & Foundry Company, at Jeffersonville, Ind., was destroyed by fire October 31. The loss is \$25,000.

The machine shops of the Atchison, Topeka & Santa Fé Railroad, at Beaumont, Texas, were destroyed by fire October 30. The loss will reach \$30,000.

A fire which started November 6 in the jobbing house of Fairbanks, Morse & Co., dealers in scales and engines, at Omaha, Neb., did \$50,000 damage.

Hardware.

Indiana Shovel Company, New Castle, Ind., are enlarging their plant and increasing their capacity to 400 dozen per day. They are erecting their own rolling mill, which will supply 30 tons of finished steel per day, and have their own handle plant. They also have their own natural gas wells and pipe lines, the gas being piped only 3½ miles from their factory. The company advise us that with the best equipment and first-class mechanics in every department they are in an advantageous position to produce shovels, spades, scoops, &c.

The Peters Cartridge Company, Cincinnati, Ohio, are crowded with orders and their factories are working night and day. This condition is referred to as due, to a very large extent, to the high quality of their product. Within the last few years especially their factories have been thoroughly organized on a scientific basis. Every detail of manufacture is carefully watched and the finished goods are subjected to exhaustive tests on scientific electrical machinery for breech pressure and velocity, and in the shooting ranges for cleanliness, penetration and pattern in comparison with other makes.

The Smith & Egge Mfg. Company, Bridgeport, Conn., whose L-shaped factory is situated on the corner of Allen and Lafayette streets, consisting of five floors 40 feet wide, are adding about 50 feet to the line on Lafayette street, with an arched

driveway running through the building. The first two floors of this part they expect to occupy as shipping and stock rooms, the remaining space being added to their assembling room. They intend also to lengthen the Allen street side of the factory, giving them additional room for their rapidly increasing chain business, which, entered upon in 1874, has now grown to be a large department with them. In addition to these changes they intend also to make a new front entrance and plan out an entirely new arrangement for the office. Altogether the company expect to add very much to their facilities for doing business, which for the past two or three years have been growing increasingly inadequate.

The Indianapolis Brush & Broom Mfg. Company, Indianapolis, Ind., are doubling their capacity in view of the demand for their Capital metal case rattan mixed, bamboo and all rattan brooms. The company also make mill, foundry, tanners' and packers' brushes, and street sweepers and brooms.

Huntley Mfg. Company, Silver Creek, N. Y., manufacturers of grain, seed and malt cleaning, coffee milling, separating and grading and buckwheat machinery, &c., have doubled the capacity of their works, adding a new engine and boiler, two large buildings, a large amount of wood and iron working machinery, air compressor plant and making other improvements.

Defiance Lantern & Stamping Company, Rochester, N. Y., have recently moved into their new factory, situated at 15 Caledonia avenue, where they have largely increased facilities for turning out their product. They will add a number of new lines to their present list for next season's business.

Elwood Lawn Mower Company, Elwood, Ind., have just added two 16 horse-power gas engines, together with other machinery, which will double their capacity for the coming season.

Miscellaneous.

The Wellsburg Coal Company have been organized at Pittsburgh and will open up large coal mines on the Panhandle Railroad, near Wellsburg, W. Va. The company have purchased 1200 acres of coal on Buffalo Creek and 135 acres of surface, and besides mining coal by electricity will erect 100 dwellings for their miners. Two mines are now being opened and are expected to be in operation by the first of the year. They will each have a capacity of 1000 tons per day. The cost of the coal, mine equipment, &c., will total \$250,000. The coal is the Pittsburgh vein, 6½ feet thick, and will be mined by drift. The officers and directors of the coal company are: Joseph A. West, president; W. Glyde Wilkins, vice-president; L. F. Darvall, secretary, and C. C. Law, treasurer.

The Pullman Company, Pullman, Ill., are having plans prepared for additions to their plant. The new buildings are to be a car shop one story high, 100 x 300 feet, and a one-story dry kiln, 500 x 72 feet. The estimated cost of construction is \$60,000.

The plant of the Winslow Bros. Company, manufacturers of ornamental iron, 386-396 Carroll avenue, Chicago, is being enlarged. The addition is a three-story structure, 112 x 141 feet.

The Freeport Spring Company, Freeport, Ill., have been incorporated, with a capital stock of \$25,000, to manufacture and sell springs. S. Hofer, A. G. Hofer, E. A. Hofer and F. N. Hofer are the incorporators.

The Wisconsin Foundry & Steel Works, at Sheboygan, have decided to erect a new building, 40 x 80 feet, which will be used as a warehouse. The improvement has been made necessary by the increased number of orders recently received by the company, according to the secretary.

The Shultz Belting Company of St. Louis, Mo., have just completed the remodeling and enlarging of their factory, and with the improved facilities in the old buildings, combined with the new ones which have been erected, their capacity has been increased two and one-half times. They now have floor space of 130,500 square feet. Among the new and modern machinery which they have in operation is a late improvement of their own design for taking all of the stretch out of leather belting. Sable rawhide belting, rawhide lace leather, belt dressing and belting cement are several of the well-known standard products of this company, and they say they are meeting with a constantly increasing demand from domestic as well as foreign sources.

The J. G. Brill Company, Philadelphia, Pa., advise us that there is no truth in the report that they had purchased the Brownell Car Works in St. Louis.

The American Ship Windlass Company, Providence, R. I., have purchased a tract of land along the harbor where they purpose to build wharves for the accommodation of vessels that come to their plant for repairs. They also contemplate the erection of a new foundry.

Owing to the rapid growth of their business the Stuart-Howland Company, electrical supplies and specialties, 279-287 Devonshire street, Boston, Mass., have been compelled for the third time in 18 months to materially increase their quarters. The latest addition includes the entire premises until recently occupied by the Pettengill Andrews Company. This will give them about 30,000 square feet of floor space, with a frontage on Devonshire street and Winthrop square of about 240 feet, and

when remodeled will make a store the equal, if not the superior, of any electrical supply store in the United States.

The Bay State Stamping Company, Worcester, Mass., J. H. Bennett, manager for the past 15 years, have purchased the Calvin Hartshorn factory on Chandler street, that city, and as soon as alterations are made the plant of the company will be moved to the new quarters. The company do stamping and forming of sheet metal and manufacture the Bennett toggled oil hole cover.

The Fisk Rapid Changer Company, formerly of Detroit, are establishing a factory at Toledo for the manufacture of a coin device for street car conductors. The company have a number of large contracts and have reorganized with \$50,000 capital stock.

The Huber Mfg. Company of Marion, Ohio, have commenced the manufacture of a new line of agricultural implements and they will enlarge their factory to push the new line.

The Standard Steel Car Company of Pittsburgh, operating a new steel car plant at Butler, Pa., have made large additions to their working forces and are now operating this plant night and day. At the present time the output is about 35 steel cars daily, but it is the intention to increase this to 60 or 70 steel cars and 20 wooden cars. The company are now completing an order for 1000 steel hopper cars of 50 tons capacity for the Chesapeake & Ohio Railroad, and are at work on an order for 500 cars for the Mobile & Ohio Railroad and a similar number for the Oregon Short Line. Within a short time the output will have reached 50 steel cars daily and at present 2300 men are employed. At Lyndora, a new suburb of Butler, where the employees of the car shops have their homes, 200 houses will soon be under roof. About 75 have already been completed and are now occupied as homes by the employees of the steel car plant.

The Cambria Steel Company of Johnstown, Pa., have received an order from the Maryland Railroad for 300 steel coal hopper cars, each with a capacity of 50 tons. The cars will be used on the West Virginia Central & Pittsburgh division of the Wabash Railroad.

The Harblson-Walker Refractories Company, Pittsburgh, Pa., are reported to have voted to increase their capital stock issue from \$25,350,000 to \$27,600,000, the proceeds of the new issue to go to purchase of other concerns.

October Fluctuations in Iron Stocks.

The following table shows the extent of transactions and the fluctuations in quotations of the stocks of iron and steel companies in the month of October, with the dates on which the highest and lowest prices on each stock were realized:

Cap'l Issued.	Sales.	High-Date.	Low-Date.
est. Oct.	est. Oct.		
\$17,701,500 Am. Bicycle Co., com.	7,400	17	17 ½
9,294,900 Am. Bicycle Co., pref.	1,500	6	16 5/8
9,500,000 Am. Bicycle Co., bonds.	53,000	47	6 46
41,233,300 Am. Can., com.	3,150	13	3 11 24
41,233,300 Am. Can., pref.	2,750	52 ½	3 45 13
29,000,000 Am. Car & F'dry., com.	30,500	37 ½	2 33 13
29,000,000 Am. Car & F'dry., pref.	10,000	93 ½	31 88 ½
24,100,000 Am. Loco., com.	27,100	31 ¾	18 28 ½
25,000,000 Am. Loco., pref.	9,300	95 ½	1 92 ½
45,000,000 Cambria Steel.	27,900	29	2 27 13
7,000,000 Central Foundry, com.	5,300	4 ½	18 2 ½
7,000,000 Central Foundry, pref.	4,000	21	17 13 4
17,000,000 Col. Fuel & Iron.	420,000	92 ½	27 79 ½
25,000,000 Crucible Steel, com.	11,500	22 ¾	3 20 ½
25,000,000 Crucible Steel, pref.	7,800	88	22 85 13
1,975,000 Diamond State Steel.	1,200	1 ½	22 1 15
2,368,100 Empire I. & S., com.	1,650	15 ½	2 13 27
2,281,400 Empire I. & S., pref.	250	50	3 45 14
15,000,000 Inter. Pump, com.	4,225	52 ½	20 49 6
8,850,000 Inter. Pump, pref.	1,000	95	2 90 14
11,000,000 International Silver.	300	24 ½	6 16 ½
8,396,000 Natl. Enamel, com.	2,700	40	6 35 ½
15,441,800 Natl. Enamel, pref.	1,200	91	10 85 7
4,449,800 Otis Elevator, com.	1,750	44	4 40 10
6,350,000 Otis Elevator, pref.	150	103	1 96 14
10,750,000 Pa., new, com., Phila.	550	55 ½	27 49 13
16,500,000 Pa., new, pref., Phila.	1,900	102	1 100 27
12,500,000 Pressed Steel, com.	103,000	63 ½	3 56 1
12,500,000 Pressed Steel, pref.	30,500	96 ½	27 90 13
10,000,000 Railway Spr., com.	20,200	38	21 34 ½
10,000,000 Railway Spr., pref.	4,150	90 ¾	31 86 13
27,191,000 Rep. I. & S., com.	58,600	23 ½	21 19 ½
20,306,900 Rep. I. & S., pref.	35,800	80 ¾	22 76 ½
7,500,000 Sloss-Shef. S. & I., com.	20,100	71	21 50 8
6,700,000 Sloss-Shef. S. & I., pref.	2,000	93	30 88 8
20,000,000 Tennessee Coal & Iron.	89,300	69 ¾	2 60 ½
1,500,000 Tidewater Steel.	1,150	5 ½	31 5 ½
12,106,000 U. S. C. Pipe, com.	32,700	17	20 15 ½
12,106,000 U. S. C. Pipe, pref.	31,400	58	20 53 13
510,361,300 U. S. Steel Co., com.	402,000	41 ½	20 38 ½
508,511,200 U. S. Steel Co., pref.	247,000	91 ½	20 87 ½
8,425,000 Virg. I. & C., com.	12,970	37 ¾	17 34 ½
1,500,000 Warwick I. & S.	4,700	6 ¾	19 6 27

The Iron and Metal Trades.

Our monthly blast furnace statement reflects the disheartened feeling among furnacemen who have been experiencing so much trouble in securing a supply of Coke. The active furnace capacity November 1 was 337,559 gross tons weekly, against 345,048 tons October 1. The reduced capacity occurs despite the fact that the Pig Iron production in October was 1,503,978 tons, or more than in any preceding month since May. More furnaces were blown out during October than were blown in, quite a number of furnacemen having grown tired of banking every few days because they had run out of fuel and decided to discontinue operations completely until better deliveries could be made. The furnaces in the anthracite region which were laid off during the miners' strike are slowly resuming. A few have been blown in since the first of the month and others are being prepared for an early resumption of work.

The general conditions in the Iron trade continue favorable in the main. Consumption is exceedingly heavy. Inquiries for Rails now in hand are large enough to cover the unsold capacity of the Steel Rail mills for next year. It is stated that not a mill in this country can promise delivery on new orders before September, and some are sold up beyond that. The Plate mills are steadily setting delivery dates further in the future. The demand for Wire products was heavier in October than in any month since January, and this month's business is keeping up with the October record. The supply of Pig Iron is still under the consumption, and importations on old orders are quite large.

Business in foreign Steel Billets is almost at a standstill, not because of the duty question, but because buyers are endeavoring to secure lower prices. Billets of easy specifications can be imported, duty paid, at a shade better than \$27.50, New York, but many consumers say the price is not low enough to enable them to work the Steel into finished products and sell at ruling market rates. A few lots of 1000 tons each have been sold the past week, but they were purchased by Steel manufacturers whose product is curtailed by shortage of fuel.

The long expected reduction in Merchant Pipe has been announced by the National Tube Company. This reduction has had some sentimental effect on the trade at large, following the reductions recently made in other finished products. The fact must be borne in mind that the reduction has not been made because of declining trade, but is a result of the greatly increased productive capacity. The consumption continues large.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one month and one year previous.

	Nov. 12, 1902.	Nov. 5, 1902.	Oct. 15, 1902.	Nov. 13, 1901.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia.....	\$23.00	\$22.50	\$22.00	\$15.25
Foundry Pig No. 2, Southern, Cincinnati.....	\$22.75	\$22.25	\$22.25	13.75
Foundry Pig No. 2, Local, Chicago.....	\$23.00	\$23.00	\$23.00	14.75
Bessemer Pig, Pittsburgh.....	\$21.50	\$21.50	\$21.75	16.00
Gray Forge, Pittsburgh.....	\$21.50	\$21.50	\$20.50	14.50
Lake Superior Charcoal, Chicago.....	\$26.00	\$26.00	\$26.00	17.00
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh.....	28.50	29.00	31.00	27.00
Steel Billets, Philadelphia.....	†27.50	†27.00	†27.50	29.00
Steel Billets, Chicago.....	†29.00	†29.00	....	....
Wire Rods, Pittsburgh.....	35.50	35.50	36.00	35.00
Steel Rails, Heavy, Eastern Mill.....	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago.....	18.75	19.00	19.00	14.00
O. Steel Rails, Philadelphia.....	21.00	21.50	21.50	17.00
O. Iron Rails, Chicago.....	24.50	25.00	25.00	21.00
O. Iron Rails, Philadelphia.....	24.50	24.50	25.00	21.00
O. Car Wheels, Chicago.....	24.00	24.00	22.50	16.00
O. Car Wheels, Philadelphia.....	21.00	21.00	19.00	16.50
Heavy Steel Scrap, Pittsburgh.....	21.00	21.00	....	....*
Heavy Steel Scrap, Chicago.....	18.50	18.50	18.50	13.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia.....	1.85	1.85	1.95	1.65
Common Iron Bars, Chicago.....	1.80	1.75	1.80	1.65
Common Iron Bars, Pittsburgh.....	1.80	1.80	1.80	1.55
Steel Bars, Tidewater.....	1.72	1.72	1.80	1.62½
Steel Bars, Pittsburgh.....	1.60	1.60	1.60	1.50
Tank Plates, Tidewater.....	2.10	2.10	2.10	1.75
Tank Plates, Pittsburgh.....	1.85	1.85	1.90	1.60
Beams, Tidewater.....	2.00	2.00	2.15	1.75
Beams, Pittsburgh.....	2.10	2.10	2.00	1.80
Angles, Tidewater.....	2.00	2.00	2.15	1.75
Angles, Pittsburgh.....	2.00	2.00	2.00	1.60
Skelp, Grooved Iron, Pittsburgh.....	1.95	1.95	2.00	1.80
Skelp, Sheared Iron, Pittsburgh.....	2.05	2.05	2.10	1.85
Sheets, No. 27, Pittsburgh.....	2.65	2.65	2.65	3.00
Barb Wire, f.o.b. Pittsburgh.....	2.45	2.45	2.50	2.90
Wire Nails, f.o.b. Pittsburgh.....	1.85	1.85	1.90	2.15
Cut Nails, Mill.....	2.05	2.05	2.05	2.05
METALS:				
Copper, New York.....	11.50	11.62½	11.70	16.85
Spelter, St. Louis.....	5.15	5.15	5.25	4.12½
Lead, New York.....	4.10	4.10	4.10	4.37½
Lead, St. Louis.....	4.00	4.00	4.00	4.25
Tin, New York.....	26.20	26.12½	25.50	25.30
Antimony, Hallett, New York.....	7.25	7.75	7.75	8.37½
Nickel, New York.....	40.00	40.00	40.00	60.00
Tin Plate, Domestic, Bessemer, 100 lbs., New York.....	3.79	3.79	4.19	4.19

* For 1903. † Foreign.

Chicago.

FISHER BUILDING, November 12, 1902.—(By Telegraph.)

With very few exceptions there has been increased activity throughout the various departments of the Iron and Steel market during the week under review. This animation has been notable in Pig Iron to a greater degree than in lines of Steel. Although there has been a more ample supply of Foundry Coke furnaces have been unable to obtain a sufficient steady supply, and in consequence about six local furnaces are now blown out. The supply of fuel during the next few months seems to be of a precarious nature, and this being recognized by consumers as well as producers has resulted in a freer buying movement of Iron for both the current year and next year's delivery; and it is significant that several of the more advanced buyers have had the temerity to place contracts for the whole of 1903 at prices ranging from \$1 to \$1.50 under those current for the first six months. Foreign Iron is being sold at a shade under the same grade of domestic, and it is being relied upon more and more to help out during the next two months. There has been some increase in buying of both Structural Material and Plates, both for prompt shipment and for delivery during the first half of 1903. Sheets and Merchant Pipe still suffer somewhat from keen competition, but there seems to be an increased volume of business. There has also been larger buying of Rails and Track Supplies. Billets, Cast Pipe, Boiler Tubes and Merchant Steel have been without special activity. Old Metals have developed a weaker feeling and Coke has declined somewhat, especially the Foundry grades, under a more ample supply of spot material. Heavy Scrap Steel has developed an easier tone, with some little decline in prices, but Heavy Scrap Iron and Stove Plate have continued very strong.

Pig Iron.—More disposition has been shown by consumers to purchase for both this year and next during the past week. The demand for spot Iron has developed in a more urgent manner, but as heretofore the tonnage is relatively small. There have been more frequent sales for November and December. For the first half of 1903 larger buyers have come into the market, and while the individual transactions are not in themselves large the aggregate tonnage is considerably above what it has been for a number of weeks. Stove men are prominent among recent buyers. Consumers who have not before covered their probable needs for 1903 are making inquiries, some of which have already crystallized into contracts. Other manufacturers who have previously placed contracts for Pig find they are melting much heavier than anticipated, and are obliged to cover contracts for Finished Material. The fact that six local furnaces are either banked or blown out—most of them blown out—accounts to a considerable extent for the increased buying, especially for November and December delivery. Foreign Iron in from carloads to 100-ton lots is being sold at prices ranging from \$26 to \$27 for No. 2, spot, track, but cargo lots for later delivery can be purchased considerably under these quotations. Local No. 2 Foundry has sold at \$27 and Standard Bessemer at \$27, spot. Southern domestic Iron for immediate delivery is commanding higher prices in some cases, No. 2 ranging from \$27.15 to \$27.65, but the outside rate is exceptional. There is also a wider range between No. 2 and No. 3 than is usually the case, while there is a narrower margin between No. 2 and No. 1 Foundry. Several thousand tons of No. 2 and No. 3 Southern Foundry have been sold on the basis of \$22.50 for No. 2 and \$21.50 for No. 3, Birmingham, for November and December delivery. No. 3, in connection with some lower grades, has been sold as low as \$20, Birmingham furnace, also for November and December. There has been a more active demand for Soft Iron, both No. 1 and No. 2, with sales of No. 1 Soft in appreciable quantities for the first quarter of 1903 on the basis of \$22 for No. 2, Birmingham. For the first half of 1903 sales will probably aggregate about 6000 tons in lots of 1000 tons each, being divided between No. 1 Foundry and No. 1 Soft and No. 2 Foundry and No. 2 Soft, on the basis of \$20 for No. 2 Foundry, Birmingham. A feature of special interest has been the buying for the last half of 1903. In some cases deliveries begin in May and others in June, extending throughout the year, on the basis of \$18.50 to \$19 for No. 2 Foundry, Birmingham. These sales, while not large, have been in 1000-ton lots, and are of sufficient magnitude to indicate the gradual establishment of the market for the second half of 1903. The almost unprecedented demand for Silvery Iron has continued throughout the week, sales being made in lots of 100 tons and more for November and December and single car lots for prompt delivery. Prices have generally ranged from \$29.15 to \$32.15 for 4 to 8 per cent. Silicon, spot. These sales are mainly of Southern Silvery. It is understood that the Jackson County furnaces are well sold ahead and are indisposed to consider business under \$30 at the furnace, either for present or for future delivery, and some sales have been made at these prices. Charcoal is still very strong, and Malleable Bessemer is held a little more firmly. Standard Bessemer is without essential change. The prices current for the first six months of 1903 are slightly revised, and are now as follows:

Lake Superior Charcoal.....	\$26.00 to \$27.00
Local Coke Foundry, No. 1.....	23.50 to 24.00
Local Coke Foundry, No. 2.....	23.00 to 23.50
Local Coke Foundry, No. 3.....	22.50 to 23.00
Local Scotch, No. 1.....	24.00 to 24.50
Ohio Strong Softeners, No. 1.....	27.50 to 28.00
Southern Silvery, according to Silicon.....	27.15 to 30.15
Southern Coke, No. 1.....	24.65
Southern Coke, No. 2.....	24.15
Southern Coke, No. 3.....	23.65
Southern Coke, No. 1 Soft.....	24.15 to 24.65
Southern Coke, No. 2 Soft.....	23.65 to 24.15
Foundry Forge.....	22.15 to 22.65
Southern Gray Forge.....	21.65 to 22.15
Southern Mottled.....	21.65 to 22.15
Southern Charcoal Softeners, according to Silicon.....	27.15 to 27.65
Alabama and Georgia Car Wheel.....	29.15 to 29.65
Malleable Bessemer.....	24.00 to 24.50
Standard Bessemer.....	23.00 to 23.50
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon.....	28.00 to 30.00

Bars.—There has been some little improvement in the demand for Bar Iron, resulting in the sale of about 1700 tons to car works at something under 1.80c., mill shipment, Chicago. There have been other sales—one lot of 300 tons between 1.75c. and 1.80c. and about 50 tons to a railroad at 1.80c., delivered Springfield, Ill. Single cars have been sold from 1.80c. to 1.85c., mill shipment, Chicago. A number of the mills are shut down for lack of specifications on old contracts, and new business is not of sufficient volume to keep all in profitable operation. It seems probable that some action will be taken to bring about a more satisfactory condition of affairs in the near future. There has also been an improvement in the specifying on contracts for Soft Steel Bars, and some little new business is in sight. The same may be said of Hoops. The following are the prices current:

Soft Steel Bars, 1.75c. to 1.85c.; Hoops, 2.15c. to 2.25c.; Angles, 1.85c. to 1.95c., base, mill shipment. There has been a fair demand from store for large sizes of Bar Flats and Rounds, but small sizes are still dull, with stocks accumulating. Prices are without essential change. Bar Iron is selling at 2.15c., Soft Steel Bars at 2c. to 2.25c., Angles at 2.50c. and Hoops at 2.40c. to 2.50c. from store.

Structural Material.—Some little increase in the specifications offering for next year has been noted, with some moderate contracts closed. The aggregate sales, however, are probably less than 5000 tons. The Commonwealth Electric Company have placed a contract for another division of their building, amounting to about 1700 tons. There are four or five large structures which will probably be erected in Chicago within the next year, and the prospect is favorable for further projects of this character, so that the outlook for increased Structural business is encouraging. As for bridge contracts, mills are sold so far ahead that the outlook is more discouraging to consumers than to producers. Little is heard of foreign material at the present time, and prices are entirely nominal. For domestic Steel, mill shipment, prices are as follows: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. The demand for immediate shipment from local stocks has been more active and even pressing, and a firmer tone has prevailed. The following are the prices current, the outside prices prevailing for definite deliveries: Beams and Channels at 2.50c. to 3c., Angles at 2.50c. to 3c. and Tees at 2.55c. to 3.50c., at local yards.

Plates.—There has been an increased demand for Plates for next year's delivery, contracts aggregating about 15,000 tons having been placed for mill shipment within the past few days. The following are the prices current: Tank Steel, ¼-inch and heavier, 1.75c. to 2.10c.; Flange, 1.85c. to 2.10c.; Marine, 1.95c. to 2.20c. There has been a freer movement from stocks at the local yards and an increased demand. The following are the prices obtained: Tank Steel, ¼-inch and heavier, 2.25c. to 2.50c.; Tank Steel, No. 8, 2.35c. to 2.55c.; Flange, 2.50c. to 2.65c., all f.o.b. warehouse, Chicago.

Sheets.—While there has continued to be quite a fair volume of business no change for the better has been noted, at least as far as prices are concerned, keen competition resulting in a low level. Galvanized has continued especially weak, and is still offered at 75 and 10 per cent. discount on the base price f.o.b. mill. The jobbing demand has continued fair, and has been freely met at the following prices: No. 20 Black Sheets sell at 2.55c. to 2.65c., No. 27 at 2.80c. to 2.90c., mill shipment. Small lots from store at 3c. to 3.10c., Chicago. Galvanized Sheets are sold at 3.25c. to 3.50c., net, mill shipment, while small lots are sold at 3.40c. to 3.65c. from store for No. 27.

Cast Pipe.—The market has been without animation, business being confined to moderate orders for small sizes, mainly for 4's, 6's and 8's, for early delivery. Manufacturers continue to sell small lots as follows: 4-inch, \$37; 6-inch, \$36; 8-inch and upward, \$35; Gas Pipe, \$1 per ton higher, all f.o.b. Chicago.

Billets.—Business in this market is confined almost entirely to single cars and jobbing lots, for which a premium is asked and obtained in most instances. While the duty question has now been decided it has not resulted in business, so far as this market is concerned. The offerings of domestic Billets are light, and prices for Open Hearth range from \$35 to \$40, according to buyer, analysis and time of delivery. Rerolling Billets are quotable at \$31 to \$32. Foreign Billets are little better than nominal at \$29 to \$29.50, delivered, Chicago.

Merchant Pipe.—Keen competition has prevented any improvement in the market, as far as prices are concerned, but the largest interest have succeeded in inviting considerable business through the method, it is claimed, of protecting prices for 30 days, and buyers still anticipate a decline in prices soon. The following are the prices current, random lengths, Chicago, subject to a discount of 10 and 5: Black, ½ to ½ inch, 56½ off; ¾ to 12 inches, 63½ off; Galvanized, ½ to ½ inch, 43½ off; ¾ to 12 inches, 50½ off. Some manufacturers are making the following prices for mill shipment, Chicago, random lengths, subject to a discount of 10 and 10: Black, ½ to ½ inch: 58½ off; ¾ to 12 inches, 65½ off; Galvanized, ½ to ½ inch, 46½ off; ¾ to 12 inches, 54½ off.

Boiler Tubes.—The market has been quiet, and prices have varied little if any, although there is still a feeling in the trade that prices of Steel Tubing will be reduced, but prices have remained unchanged, subject to an additional discount of 5 per cent. from the schedule for mill shipment, which is as follows:

	Steel.	Iron.
1 to 1¼ inches.....	43½	38
1¼ to 2½ inches.....	56	36
2½ to 5 inches.....	61	46
6 inches and larger.....	56	36

There has been a less active movement of small lots from

store, and prices have remained as shown in the following schedule of discounts:

1 to 1½ inches.....	35	35
1½ to 2½ inches.....	47½	32½
2½ to 5 inches.....	55	42½
6 inches and larger.....	47½	..

Merchant Steel.—No change has been noted in the character of the business, there being fair specifying on previous orders and a moderate new business in specialties. Manufacturers still note the inability to make prompt shipments from lack of adequate transportation facilities. For mill shipment prices are as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.95c. to 2.10c.; Open Hearth Spring Steel, 2.65c. to 2.75c.; Toe Calk, 2.25c. to 2.40c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 47 off in carload lots and 42 off in less than car lots. Ordinary grades of Crucible Tool Steel are quoted at 6c. to 7c. for mill shipment; specials, 12c. upward.

Rails and Track Supplies.—There has been renewed buying of Heavy Rails for late next year's delivery, about 18,000 tons of Standard Sections having been placed during the week for fall delivery. About 2000 tons of second quality have been sold for this year's delivery, together with about 500 tons of Light Rails. There are some negotiations still pending on foreign Sections, but no appreciable business has been closed during the week. There is still quite an inquiry for Relaying Rails, which are scarce. Official prices for domestic Rails remain unchanged at \$28 for standard and \$27 for second quality, mill shipment. Splice Bars, Spikes, Bolts and Nuts continue in active demand and firm. The following are the prices current: Splice Bars or Angle Bars, 2c.; Spikes, 2.50c.; Track Bolts, with Hexagon Nuts, 3.10c. to 3.45c.; Square Nuts, 2.95c. to 3.10c.

Old Material.—The market for Heavy Cast Scrap and Stove Plate has continued very strong and firm, but for heavy material, such as Old Rails, Fish Plates, Axles, Railroad Wrought and Dealers' Forge, there has been a little easier tone resulting from smaller consumption by the mills, although the offerings are but little increased. Old Car Wheels continue very scarce, and are wanted at full prices. Relaying Rails are also in good demand and firm, with moderate sales at quotations. The following are the prices per gross ton, Chicago:

Old Iron Rails.....	to \$24.50
Old Steel Rails, mixed lengths.....	\$18.75 to 19.00
Old Steel Rails, long lengths.....	23.50 to 24.50
Heavy Relaying Rails.....	32.00 to 32.50
Old Car Wheels.....	24.00 to 25.00
Heavy Melting Steel Scrap.....	18.50 to 18.75
Mixed Steel.....	15.50 to 16.00

The following quotations are per net ton:

Iron Fish Plates.....	\$22.00 to \$22.50
Iron Car Axles.....	24.50 to 25.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	21.00 to 21.50
No. 2 Railroad Wrought.....	18.50 to 19.00
Shafting.....	20.00 to 21.00
No. 1 Dealers' Forge.....	.. to 17.00
No. 1 Bushelling and Wrought Pipe.....	15.00 to 15.50
Iron Axle Turnings.....	.. to 15.00
Soft Steel Axle Turnings.....	14.50 to 14.75
Machine Shop Turnings.....	14.00 to 14.50
Cast Borings.....	10.25 to 10.75
Mixed Borings, &c.....	10.50 to 11.50
No. 1 BOLLERS, cut.....	14.50 to 15.00
Heavy Cast Scrap.....	17.00 to 17.50
Stove Plate and Light Cast Scrap.....	13.50 to 14.00
Railroad Malleable.....	16.25 to 16.75
Agricultural Malleable.....	16.00 to 16.25

Metals.—Copper has been dull and weak, with little business at the reduced prices. Lake is quotable at 11½c. in carload lots and 12c. in a jobbing way. Pig Lead has continued firm, with a good demand at 4.05c. in 50-ton lots, 4.07½c. in carload lots and 4.10c. in a jobbing way. Sheet Zinc has remained firm, with a fair movement at 6½c. in carload lots and 6.65c. in lots of 600 lbs. Old Metals have been dull, with Copper and Brass a little lower. The following are the prices current: Heavy Cut Copper, 10½c.; Red Brass, 10½c.; Copper Bottoms, 9½c.; Lead Pipe, 3.90c.; Zinc, 3.90c.

Coke.—There has been a more ample supply of Foundry Coke and lower prices have ruled during the week, sales being made at prices ranging from \$10.50 to \$12, on track, Chicago. Contracts for the first half of 1903 have been made on the basis of \$5 at the ovens, and Furnace Coke at 50c. to \$1 per ton under these prices. It is understood that contracts have been entered into by the Frick Company to furnish Furnace Coke to some merchant furnaces at \$3 at the ovens for 1903, a proviso in the contract stipulating, however, that deliveries are to be made only from surplus supply—that is, from the supply over and above the consumption by the constituent companies of the United States Steel Corporation.

A. M. Crane & Co., Incorporated, Chicago and New York, are importing a considerable quantity of structural material to be used in erecting the World's Exposition buildings at St. Louis.

Philadelphia.

FORREST BUILDING, November 11, 1902.

The situation is beginning to clear itself in some respects, although it is by no means settled or satisfactory. The disposition to expect better fuel conditions has been pretty well abandoned, however, and with that the hope of a less stringent market for Pig Iron has also been abandoned. Some of the large producers of Coke have notified their customers that smaller shipments, rather than larger, must be figured on during the remainder of the year, so that for the present the output of Pig Iron cannot be increased to any great extent, if at all. There is more Anthracite Coal, but not enough to give any substantial relief, although furnaces are being prepared for operation as soon as fuel can be accumulated. The supply of foreign Iron is not as full as it has been and unless shipments are hurried forward spot Iron will again be at a sharp premium. The advance in ocean freights, due to the charters for Coal shipments, has delayed some rather large shipments of Pig Iron, so that there is quite a possibility of another period of severe shortage before the close of the year. The entire situation, in fact, rests on a very unstable foundation, and on every side the little word "if" is necessary in any diagnosis of the market that may be made at the present time. Ordinarily it is taken for granted that material loaded on cars will be delivered within a reasonable time, but at present it is "if motive power can be had," "if the cars do not get side tracked" and "if so and so" all the way from the mines to mill or foundry, as the case may be. The margin, or reserve for contingencies has been in the steady arrivals of foreign Iron, but if these fail for a few days, or a week or two, another pinch will be felt. Other contingencies are not beyond the range of possibility, such as weather conditions, which have been singularly favorable so far; but winter is coming on and interruption to the transportation service is always liable to happen sooner or later. Under ordinary conditions reference to these matters would seem to be puerile, but present conditions are altogether exceptional, so that these features cannot be ignored by people who really desire to make a full and complete survey of the situation. The next consideration is that of prices, but as these are contingent upon matters which have already been referred to it will be seen that there is a good deal of uncertainty in regard to them. The feature which has developed considerably during the past week or two, however, is that prices of Pig Iron are not going to be lower this year, and presumably not during the first quarter of next year, unless something entirely unforeseen occurs. The cost of production will be far and away beyond anything that was figured on six months ago, and as the article will be scarce and hard to get makers will certainly not lower their prices. Some good buyers have decided that it is safer to buy at to-day's prices rather than take chances until a later date, and a fair amount of business has been done at around \$23 for No. 2 X Foundry for deliveries from now to April. In some cases 50c. more has been paid, in others a little less than \$23, although that figure would now be an inside rate for a standard Iron. The tonnage changing hands has not been large, but it was large enough to clean up pretty much all that was offered, and at this writing buyers would have to hunt for it if they wanted even a moderate sized lot. Foreign Iron during the week has been rather quiet for two reasons: 1, There is practically nothing on the spot, and, 2, there is no disposition to either buy or sell to arrive. Lots afloat are pretty sure to command ready sale on arrival, and as importers offer no inducements to anticipate them business is temporarily in abeyance. Cargo lots could be brought in at prices ranging from \$19.25 for No. 3 Middlesbrough to \$21 for Scotch No. 3, or about \$22.50 for No. 1, but a good deal depends on brand. The general trade situation is fairly good, but there is not the buoyancy that was so conspicuous until recently. It may be just a temporary slackening up, but the weakness in prices of some of the leading specialties is regarded as a little discordant and for the time being the business attitude is one of caution, pending further developments.

Pig Iron.—There is so little Iron for sale that new business has dwindled to very small proportions. A few unimportant transactions are made once in a while, but the tonnage is small simply because the Iron is not to be had in quantity. Prices are higher than they were a week ago and long or short date deliveries make very little difference as regards price. Buyers have to pay \$23 to \$23.50 for this year's shipments, and with the present outlook as regards costs makers are not inclined to quote less for next year's shipments. The market is therefore keyed up to the highest figures of the entire year and present indications point to the possibility, if not probability, of still higher prices before there is any easing up. Foreign Iron has helped consumers out wonderfully, but there is not as much Iron afloat as the market may require, and the possibility of decreased supplies from abroad may add to the perplexities of the situation. The decrease in shipments is partly due to the advance in ocean freights and partly to the belief that the American market would be sufficiently supplied when the

Coal strike was ended, which is no doubt rather a premature conclusion. There is plenty of foreign iron to be had, however, by waiting a few days more or less, and at current quotations there is a good margin for importers. At present, and for a week or two, the arrivals may be smaller, but price will bring it forward subject to the delays mentioned. Prices at this writing are about as quoted below, but sellers' ideas vary considerably, although a fair average for city or nearby deliveries in buyers' yards would be about as follows:

No. 1 X Foundry.....	\$25.00 to \$26.00
No. 2 X Foundry.....	23.00 to 24.00
No. 2 Plain.....	22.25 to 22.75
Gray Forge.....	21.00 to 21.50
Middlesbrough.....	21.50 to 22.50
Scotch.....	23.00 to 24.50

The two last mentioned would be 50c. to \$1 less alongside vessel. American iron is about the same prices for spot deliveries or any time up to April.

Billets.—Not much business doing. German steel is quoted \$27.50 to \$29; American \$30.50 to \$31.50. Firm offers are asked for at a trifle below these figures, but unless for small lots there is no disposition to do business.

Plates.—The extreme difficulty in getting regular supplies of coal is intensifying the shortage in plates, as deliveries are running a good deal behind, with little prospect of catching up in the near future. There is a good deal of new business around, however, but orders are taken subject to delays in delivery, which at best are likely to be more or less disappointing. Prices strong at about the following figures: Small lots, 2.10c. to 2.15c.; carload lots, 1/4-inch and thicker, 2c. to 2.05c.; Universals, 2c. to 2.05c.; Flange, 2.10c. to 2.20c.; Fire Box, 2.25c. to 2.30c.; Marine, 2.30c. to 2.35c.; Charcoal plates, C. H. No. 1, 2 1/2c.; C. H. No. 1 Flange, 3c.; C. H. No. 1 Flange Fire Box, 3 1/2c.

Structural Material.—There is a wide disparity in prices, and sellers seem to ask all sorts of prices from 1.75c. up to 2.50c. It is a singular anomaly, but the facts are as stated, and can only be accounted for by an urgency for sizes that require to be specified at mill, while others are deliveries from stock.

Bars.—Reports are not very uniform in regard to the bar trade. Some mills appear to have plenty of work, and claim to be getting 1.90c. to 1.92 1/2c., while others say they lose business at \$1 a ton less money. Steel bars can be had at 1.75c. for small sizes, but 1.90c. to 2c. has to be paid to get large sizes. The market is very irregular, but there is a fair demand and at a price, mills seem to be able to get business.

Sheets.—The market is very uneven, and some very low prices are heard of once in a while. Local mills are running full, but on first-class business buyers can make favorable terms.

Old Material.—The market is easier, and in some lines prices have to be marked down pretty sharply to get business. The following are the bids and offers for lots delivered in buyers' yards:

Old Steel Rails.....	\$21.00 to \$21.50
Heavy Steel Scrap.....	20.50 to 21.00
Low Phosphorus Scrap.....	26.50 to 27.50
Old Steel Axes.....	25.50 to 26.50
Old Iron Rails.....	24.50 to 25.00
Old Iron Axes.....	30.00 to 31.00
Old Car Wheels.....	21.00 to 21.50
Choice Scrap, R. R. No. 1 Wrought.....	23.00 to 24.00
Country Scrap.....	20.00 to 21.00
Machinery Cast.....	19.50 to 20.00
No. 2 Light Scrap.....	17.00 to 18.00
No. 2 Light (Ordinary).....	14.50 to 15.00
Wrought Turnings.....	16.00 to 16.50
Wrought Turnings, Choice Heavy.....	17.00 to 17.50
Cast Borings.....	10.50 to 11.00
Stove Plate.....	15.00 to 16.00

Cleveland.

CLEVELAND, OHIO, November 11, 1902.

Iron Ore.—The week just closed has seen a few changes in the rates of carriage which have been rather difficult to explain. The record of the movement down the lakes up to November 1 shows that the total has passed the 24,000,000-ton mark. At the beginning of the season it was anticipated that perhaps the entire movement for the year would exceed 23,000,000 tons or reach 24,000,000 tons at the outside. This maximum has already been reached and passed and the shippers are beginning on another month of activity, during which it is proposed to ship down the lakes at least 2,000,000 tons. It will be recalled also that there is an all rail movement of perhaps 500,000 tons to be considered, which will bring the grand total for the season up past the 26,500,000-ton mark. With these figures uppermost in the minds of all of the lake men and with the understanding that all of the ore that will possibly be melted during the coming winter is now on the docks or at the furnaces, it is difficult to understand how the vessel interests could force a change in rates amounting to 10c. a ton from Escanaba entirely against the wish of some of the shippers. The evident justice of the claim of the vessel interests that their expenses are higher and therefore an increase in rates ought to be con-

ceded is in part responsible for the increase, but not altogether. Some few of the shippers find themselves short on certain grades of ore, while they have a superabundance of other grades down the lakes. This is in part responsible for the bidding for tonnage. The shippers are divided on the rate policy, the so-called independent shippers paying the advances out of Escanaba and the Steel Corporation withholding their ore from the general market and continuing their own boats in service to handle their own product. The Steel Corporation are likewise responsible in a very large measure for the enormous movement of ore, for while they will not need all that has been brought down for them, the wise policy is to keep a liberal surplus on hand for an emergency which might curtail the shipment of that material during the early part of next year. Rather than run short on an emergency the large movement for this year is being made. The so-called independent shippers have increased their movement of late also because of certain sales of low grade ores which have lately been made. The rates of carriage are revised as follows: Duluth to Ohio ports, 80c.; Marquette to Ohio, 70c.; Escanaba to Ohio, 70c.; Escanaba to Buffalo, 75c. The sales of ore have been made at the old prices of \$3.25 for non-Bessemer Old Range and Bessemer Mesaba, the grades that have been sold.

Pig Iron.—The situation continues to grow more perplexing and distressing. The coke shortage, instead of being relieved in any way, is becoming steadily more aggravated, and it is beginning now to appear as if one of the hardest winters of the past decade is ahead of the producers. It was thought last winter that the maximum of evil from the coke shortage had been reached, but it seems now as if there was something new to be experienced in that line before this year is out. A few of the furnaces in the Valleys have resumed operations during the past week, but they did not get started as soon as it was hoped they would and the resumption of work is by no means general. Those furnaces which are starting up now have but a single week's supply of coke ahead of them, and it is beginning to look as if they were not to receive any added amount soon. Looking ahead there is but a vague promise of relief to the furnaces and most of them are not placing any hope in that whatever. It seems barely possible that when the season of navigation on the lakes has ended there will be a slight relief to the coke situation. In this connection, however, it is apparent that the ore shipments have been lessened of late by the withdrawal of large numbers of cars from that trade, and the docking of ore during October and so far in November has been vastly heavier than at any time during the year. The supply of cars for the lake coal trade has been but about one-sixth of the usual need of the shippers. Since the withdrawal of this equipment from the lake trade has not helped the coke shippers in the least, there is hardly any possibility of material relief when the withdrawal of equipment from the lake trade has been complete. The lessened activity among the furnaces has, of course, produced a radical effect upon the market conditions. Iron of all grades for spot shipment is almost entirely out of the question. Now and then a single carload of No. 2 Foundry shows up, which is immediately grabbed at any price which the producer chooses to name. In many instances sales have been made of late as high as \$27, at the furnace, while in some cases as high as \$28, valley furnace, has been paid. These sales of necessity are very few and scattering. The condition of the furnaces as to unfilled orders makes it increasingly impossible to make any quotation for the future. The least that any furnace is quoting now is \$23 for No. 2, Valley furnace, for delivery during the first half and \$21, Valley furnace, for second half delivery. Basic and Bessemer producers are out of the market, and while they ought to deliver what material they have sold before April 1, it will be the end of the first half before present orders are cleaned up. This will prevent any large selling for first-half delivery, although some may be possible if there is any relief soon from the coke situation.

Finished Iron and Steel.—The difference in the status of the two sides of the market, the heavy and the light grades, continues to grow. The heavy steel increases in demand and the lighter grades are even in less demand than formerly. The weakness in the bar trade is quite marked. It was seemingly apparent a week ago that the trade had started to revive slightly, and that the business was on the verge of a boom such as has characterized the other heavy articles. It seems, however, that while the material is well sold up for the remainder of this year there is some anxiety as to orders for that period past the first of the year. It has been reported of late that the small producers of steel bars have been selling their output at a reduction, and have by this means affected the market so that a general reduction or at least the meeting of the competition will be seen soon. The larger mills disclaim, however, any knowledge of weak conditions in the market. There was a display of strength in the bar iron market recently, which is hardly warranted by the circumstances. In fact, it seems now that, while the mills are quoting publicly 1.80c., Pittsburgh, choice orders are taken for less money, and that 1.70c., Pittsburgh, comes nearer representing the basis upon

which most transactions are made. This, however, about sums up the weakness in the finished trade of the heavier grades. Structural Steel presents the only other article upon which there is any doubt, and the buying of this has been so brisk as to remove it almost completely from the doubtful list. True it has not been sold as far ahead as some of the other articles, but still there is a good demand, and while the uncovered capacity for the first half of next year will permit liberal ordering for some time there are no elements of weakness in the situation. The demand now existing for this material and the heavy sales for spot delivery at large premiums are most hopeful signs that the Steel men are not overlooking. The fact that the larger mills have some uncovered capacity for the first half of next year is preventing the smaller mills from making any sales at premiums, although they are withholding their material from the market expecting to obtain premium prices for it after the first of the year, or to keep busy supplying the material that the larger mills will not be in position to produce. The standard mills are still quoting 1.60c., Pittsburgh, while the jobbers are getting 2.50c. to 3c. out of stock and the smaller mills are demanding from 2.50c. to 2.60c. at the mill, having no difficulty to dispose of any amount they may have for sale. Plates are really the strong part of the market, being sold well up into the second half of next year at the old association price of 1.60c., Pittsburgh, which, of course, applies only on the product of the larger mills. The output of those larger mills has not been disposed of completely, but a good portion of it has been sold for that length of time ahead. The smaller mills now are getting 2c. to 2.10c. without difficulty on all material they have for sale during the remainder of this year, or as far ahead as they choose to make contracts into next year. The fact that the larger mills have been so well sold up and that the needs of the market have not been met is presenting a promising field for the smaller mills. The jobbers also are selling all of the material they can get hold of, and have been quoting 2.50c. out of store for it. The demand for Rails is fairly good considering the previous heavy selling of the standard grades, and there is also a good demand for the Light Rails, which are scarce. The Standard Rails are still selling for \$28, and the price of Light Rails ranges between \$39 and \$42. Billets are in good demand, with the supply of Bessemer fairly good. The price quoted is still \$30, Pittsburgh. The Sheet, Wire and Tube trades are all dull. Sheet prices especially have been weak, and while no further reductions have been made the market is weak at the old quotations—namely: No. 27, one pass cold rolled, out of stock, 3.10c. to 3.25c.; for the same in carload lots at the mills, 2.85c. to 2.95c. For No. 27 Galvanized Sheets as a base the price is 3.70c. to 3.85c.

Old Material.—The speculative feature of the Scrap market seems to have disappeared entirely, and the various articles are coming down to a more reasonable figure. Scrap is now easier to obtain than it has been, and while the prices to the consumers have not been reduced it is reasonable to suppose that they will be soon, as the collectors have been easing up in their demands upon the middlemen. The prices continue to be as follows: No. 1 Wrought, \$21, net; Iron Rails, \$27.50, gross; Iron Axles, \$28, net; Cast Borings, \$12, gross; Wrought Turnings, \$16.50, gross; Cast Scrap, \$19, net; Car Wheels, \$19, gross; Heavy Melting Steel, \$19, gross; Old Steel Rails, \$20, gross.

Cincinnati.

FIFTH AND MAIN STS., November 12, 1902.—(By Telegram.)

The Pig Iron situation continues to be so woefully marred by the difficulties which beset the problems of Coke and transportation that a quietness exists which might otherwise be missing. These two problems are so annoying and full of perplexity as to cover up in a great measure other factors in the market. There is a strong feeling that while in all probabilities prices will settle somewhat from the present high level, yet there is nothing in sight to bring about any great reaction. The difficulties in the Coke and car situation alone must prove strong supporting factors. The scale of prices is just about the same as last given. Values still differ materially. Some sellers think spot delivery Iron is \$2 higher than the maximum figures herewith given for Southern Foundry brands, and there are yet others who say that No. 2 can be bought on as low a basis as \$20, Birmingham. A spot delivery sale of 1000 tons of No. 4 Foundry is reported on the basis of \$15.85, Birmingham. But little effort is being made to sell Iron on account of the trouble experienced in getting Iron forward on old orders. Salesmen in the main are avoiding personal contact with customers on account of the prevalence of complaint. Freight rate from the Hanging Rock district \$1.10, and from Birmingham to Ohio River points \$3.25. We quote, f.o.b. Cincinnati, for 1902 delivery, as follows:

Southern Coke, No. 1.....	\$25.00 to \$26.00
Southern Coke, No. 2.....	24.00 to 25.00
Southern Coke, No. 3.....	23.00 to 24.50
Southern Coke, No. 4.....	19.00 to 20.00
Southern Coke, No. 1 Soft.....	25.00 to 26.00
Southern Coke, No. 2 Soft.....	24.00 to 25.00

Southern Coke, Gray Forge.....	19.00 to 20.00
Southern Coke, Mottled.....	19.00 to 20.00
Ohio Silvery, No. 1.....	30.10 to 32.10
Lake Superior Coke, No. 1.....	26.10 to 26.60
Lake Superior Coke, No. 2.....	25.60 to 26.10
Lake Superior Coke, No. 3.....	25.10 to 25.60

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$28.25 to \$29.25
Lake Superior Car Wheel and Malleable	27.50 to 28.50

Quotations for first six months of 1903, f.o.b. Cincinnati, the buyer to assume freight difference which may exist at time of shipment, are as follows:

Southern Coke, No. 1.....	\$22.75 to \$24.00
Southern Coke, No. 2.....	22.25 to 23.25
Southern Coke, No. 3.....	21.75 to 22.75
Southern Coke, No. 4.....	21.25 to 22.25
Southern Coke, Gray Forge.....	21.25 to 22.25
Southern Coke, Mottled.....	21.25 to 22.25
Southern Coke, No. 1 Soft.....	22.75 to 24.00
Southern Coke, No. 2 Soft.....	22.25 to 23.25
Lake Superior Coke, No. 1.....	26.60 to 27.10
Lake Superior Coke, No. 2.....	25.60 to 26.10

In reference to the quotations for 1903 it must be understood that the minimum figures for Southern Irons are applicable to Virginia brands, and the maximum solely to the Tennessee and Alabama product.

Old Material.—We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, \$21 per net ton; Cast Scrap, \$18 per net ton; Iron Rails, \$24.50 to \$25, gross; Steel Rails, long, \$24 to \$24.50, gross; Steel Rails, short, \$18.50 to \$19, gross; Iron Axles, \$27.75 to \$28.25, net; Car Wheels, \$21 to \$21.50, gross.

Plates and Bars.—The market is not so strong, though the prices are nominally unchanged. Iron Bars in carload lots, 1.92c., with half extras; same, small lots, 2.20c., full extras; Steel Bars, carload lots, 1.72c., with half extras; same, small lots, 2.20c., full extras. Plates are quoted nominally, 1/4-inch, in carloads, 1.70c.; same, 3-16, 1.80c. As a matter of fact, however, mills having Plates to ship are getting 2.15c. without trouble. I-Beams and Channels, 1.70c., base. All prices f.o.b. Cincinnati.

The Chattanooga sales office of the American Sheet Steel Company, which has been in charge of W. T. Shannon, has been consolidated with the Cincinnati office. Mr. Shannon continues with the company as assistant sales manager to S. J. Waterman, who is now in charge of the combined offices. Mr. Shannon will continue to look after the Southern territory.

Birmingham.

BIRMINGHAM, ALA., November 10, 1902.

The bridle is off the market and it has no rider. Each interest fixes its own price regardless of what may be demanded by the other interests, for there is room for all who have Iron to sell. The market can be characterized as one of great variability. As an illustration of this, one buyer came into the market for nearby delivery Iron, and it was quoted to him at \$24 to \$25 for No. 2 Foundry, and the seller made the announcement that he had none to sell. He was a desirable customer. He called upon another seller and had it quoted at \$23.50 for November and December delivery. He was quick to take the 200 tons offered to him, but wanted more. At another office he was quoted at \$23 and took 500 tons offered and still wanted more, and added to it some Charcoal Iron at \$24 for No. 2 Foundry, the grade being a little off. Spot and nearby Iron sold at \$25, as did also No. 1 Foundry. No. 2 Foundry was sold also at \$24. Some No. 3 Foundry was sold at \$22.50. So one can quote the market at from \$22.50 to \$25 for No. 2 Foundry. This gives a range in which luck counts as to price. Gray Forge is yet quoted at variable figures, but it looks as if there was a disposition to ease up on that grade and \$17 is quoted by some parties, who are in the market for limited amounts. There are some who ask \$18 and who report sales, while others won't quote under \$19.

For the first half of 1903 \$21 is asked for No. 3 Foundry and sales have been made on that basis for No. 2 Foundry. For the last half of 1903 there have been sales at \$19, while some hold at \$20, and made sales at that price. Once in a while you hear \$18 talked and that price is quoted by some correspondents in some of the buying markets. But your representative can't find any seller who will admit a sale at those figures.

The burden of these letters of late has been the difficulty of finding Iron for sale. We are switched off now to a new trouble. The car famine has struck the Iron interests and Iron is being piled up in the yards now to await that convenient season when cars shall be forthcoming to move it. This trouble will be shared by the buyers and if bad weather is near at hand the situation and deliveries will be worse than ever. It is current rumor that Cincinnati is choked up with a gorge of 2000 cars, which cannot be cleared out of the way, and routing of Iron that usually goes by that point has to be diverted to other routes. Even a perfection mattress fails to bring rest to the worried Iron master. When he could ship, he did not have the Iron, and now that he is making progress he finds that he can't ship it. In the

meantime some buyers cannot or will not take in the situation and there is a ceaseless clamor for the Iron overdue. A terse way of putting it is we are blocked in our shipping facilities and buyers may as well realize that fact. The furnace interests can't remedy the matter. It is up to the railroads. Even right here in this district the local deliveries are all out of gear, it takes days to deliver what ought to be in hands of consignees in a few hours after billing.

If there was any stock on hand one could safely predict an easing up of the market, as some conservative men in the trade do not regard present prices with favor. But they have no Iron to sell and are delivering current make at much lower values. It would be hard for them to convince one who has Iron to sell that current price was too high. So that element can only wait until normal conditions are resumed and there is no evidence of their being in sight yet. Some large buyers were in the market and your correspondent is satisfied that all their takings were not reported. Speaking of car shortage it can be stated for the benefit of your readers dependent upon the Southern road for their supplies, they announce that they will move 15 locomotives to this district from other divisions and they will soon relieve the congested condition of affairs. Coal is having the hardest time. Empties are scarce and placed with uniform irregularity and the miners are getting in only about half time.

A report comes from good sources that among the additions and betterments determined upon is a new furnace at Ensley, in size to be the largest in the South, and equipped with all the modern appliances. The other furnaces of the Tennessee Company there will be gradually rebuilt, but the process can only be slow and it may be two years before the additions are completed and the plant thoroughly modernized.

It is current gossip here in well informed circles that the Southern Car & Foundry Company was taken over at \$3,000,000, part of the price being paid in stock and part in cash. But just in what proportion one cannot learn here. There are some rumors afloat concerning some other mergers or combinations, but they look fishy. Henry Knoth, who is in charge of the Steel mill at the Birmingham Rolling Mills, announces a discovery for making Steel by a continuous process, lessening the time to get out a heat and dispensing with the Scrap Iron, which is an important element in present methods. Of course there is economy claimed in production. It can be added that Mr. Knoth has been connected for a long time with large Steel works in Germany and this country, and he is, therefore, no neophyte in the business.

There is no change apparently in the Coke situation. Sales are reported to your correspondent at prices all the way from \$6 to \$8. One interest is able to place all it can deliver at \$7.50. The top price is not the current market.

The Commercial Club is now negotiating with parties for the establishing of a Glass factory, a large tannery and a large furniture factory. At the present writing indications favor success. Diversification of industries is what we want.

We are now at that period of the year when business usually begins to slack up on account of the approaching holidays. But there is no evidence of that yet. There is no halting now. Everything is in a rush.

St. Louis.

CHEMICAL BUILDING, November 12, 1902.—(By Telegraph.)

Pig Iron.—The market pursues an even tenor, the volume of demand and inquiry being unchanged. Spot Iron finds a ready market, but buyers are not urgent in their demands for material for far off delivery. Prices rule firmly on the same basis as last reported. We quote, f.o.b. St. Louis:

Southern, No. 1 Foundry.....	\$24.25 to \$28.75
Southern, No. 2 Foundry.....	23.75 to 27.75
Southern, No. 3 Foundry.....	23.25 to 26.25
Southern, No. 4 Foundry.....	22.75 to 25.75
No. 1 Soft.....	24.25 to 26.25
No. 2 Soft.....	23.75 to 25.75
Gray Forge.....	22.75 to 24.75
Southern Car Wheel Iron.....	to
Malleable Bessemer.....	to
Ohio Silvery, 8 per cent. Silicon.....	to
Ohio Strong Softeners, No. 1.....	to
Ohio Strong Softeners, No. 2.....	to

Bars.—The movement for both Iron and Steel Bars is along satisfactory lines, and the booking by the mills for next year's delivery is said to be of a substantial character. We quote from the mills: Iron Bars at 1.90c. to 1.95c. and Steel Bars at 1.80c. to 1.90c. Jobbers quote Iron Bars at 2.25c. and Steel Bars at 2.25c.

Rails and Track Supplies.—The volume of business is on the increase, and the mills are said to have already booked sufficient orders to keep them very busy far into next year. We quote as follows: Splice Bars, 2.10c.; Bolts, with Square Nuts, 3c. to 3.10c.; Hexagon Nuts, 3.25c. to 3.30c., and Spikes, 2.60c. to 2.75c.

Pig Lead.—Steady and firm conditions rule in the market for Pig Lead, and but very little change is to be noted in the volume of transactions. We quote Chemical at 4c. and Desilverized at 4.02½c.

Spelter.—Inquiry and demand show little sign of abatement since our last report, the market being kept on a firm and steady basis. Quotation of 5.15c. is maintained, with occasional advances for spot delivery.

The Inland Equipment Company, 417 Bank of Commerce Building, St. Louis, are now acting as the St. Louis representatives of Dana & Co. of New York for the sale of their Wigan make 80 per cent. Ferromanganese and other furnace products embracing Spiegeleisen, Silico-Spiegel and Bessemer Pig Iron. They report business good in these lines, and with prospects favorable for a continued increase.

Pittsburgh.

(By Telegraph.)

PARK BUILDING, November 12, 1902.

Pig Iron.—The market on Pig Iron continues very firm, and high prices are being paid for small lots for this and next month's shipments. The Coke situation is no better, and furnaces continue to bank right along waiting for Coke to arrive. This is helping very much to keep prices of Iron high, owing to limited output. All the furnaces are more or less behind on contracts, and a good deal of Iron will be carried over into next year that should have been shipped out this year, and which has been sold at prices very much lower than are now ruling. The production of the furnaces for the first six months of next year is pretty well under contract, and it does not seem that prices of Iron can go back any for the first three or four months at least. Bessemer Iron in small lots for early shipment brings \$23 to \$23.50 at furnace. For next year Bessemer is held at \$21 to \$21.50 at furnace. It is intimated that the deal for the purchase of a large block of Bessemer Iron by the United States Steel Corporation may be taken up again before long. Gray Forge Iron is somewhat dull in demand, and prices are weak. It could be bought to-day at \$21, Pittsburgh, or probably less. No. 2 Foundry Iron for prompt shipment has sold at \$24 to \$25, but for next year's delivery could be bought at about \$23 or less.

Steel.—There is not much Steel moving and the tone of the market is not as firm as it has been, partly due no doubt to the recent cuts in prices on some lines of finished products. We quote Bessemer Billets at \$28.50 to \$29, Pittsburgh, but on a firm offer and for extended delivery \$28 could probably be done. Open Hearth Billets are \$31 to \$32, depending on carbons and specifications. We note sales of 8000 to 10,000 tons at these prices.

Muck Bar.—The market is weak and with practically no demand. We quote local makes of Muck Bar at \$35, delivered.

(By Mail.)

There is no denying the fact that recent developments in the Iron trade, principally the reductions in prices on some lines of Finished Material, are causing a good deal of uneasiness and buying is almost at a standstill, consumers evidently having decided to hold off until the situation is clearer. The recent cuts in prices on Sheets, Wire products and Tin Plate have been followed by new discounts on Merchant Pipe, sent out by the National Tube Company, which carry a material reduction in prices. Those who take a pessimistic view of the situation argue that the cuts in prices already made are simply forerunners of others that are to come and that there will be a further leveling of values all around. Beginning with raw material, it may be noted that Coke for next year will be from \$1 to \$2 a ton higher than this year, while Ore will also be higher. The situation in Pig Iron is very strong, furnaces being sold up well into the first half of next year and at high prices. Finishing mills are short of metal right along and the leading interest are urging prompt shipment on contracts which they have with the furnaces for Iron and occasionally find it necessary to close down for want of metal. Part of the Homestead Works has been idle recently for several days at a time, waiting for Iron to arrive. The Steel market is fairly firm, and while demand is not large, there is no pressure on the part of the Steel mills to sell. In Rails the mills have enough tonnage booked to take their entire output up to September of next year. The same condition prevails in Structural Material and Plates, the mills being practically sold up for first six months. In view of this we do not see that there is much cause for the present alarm and believe that the situation will work out all right. It would not be surprising if the United States Steel Corporation should open up negotiations at any time for the purchase

of a large block of Bessemer Iron for delivery commencing next April. The corporation has no Iron bought beyond March and will have to come in the market sooner or later. It would seem, however, that buyers are scared and are inclined to be very cautious for the present at least. The amount of new tonnage that is being placed is relatively small, but, aside from Sheets, Tin Plate and Wire products, the mills are pretty comfortably filled and will not be in urgent need of tonnage for some time yet. In Merchant Pipe we may note that demand is larger now than it was at this time last year, but there has been a large increase in capacity and it takes more work to keep the mills filled up. We believe the present unsatisfactory condition is only a temporary one and that it will soon show material improvement.

Steel Rails.—About 50,000 tons have recently been placed and it is announced that the Rail mills are covered into September of next year. Over 300,000 tons will be carried over into next year and over 1,200,000 tons of new business has been booked. We quote at \$28 at mill.

Muck Bar.—The market is very quiet and we quote local makes of Muck Bar at about \$35.50, Pittsburgh. Eastern Bar continues to be offered at \$34 or less, delivered here.

Rods.—The quiet condition of the Wire trade is reflected in Rods, demand for which is light. We quote Domestic Rods at \$35.50 to \$36 and Open Hearth at \$37, maker's mill.

Sheets.—The Sheet trade has not shown much improvement, some of the mills reporting that it is almost impossible to get specifications on old contracts. A number of leading mills are still idle and will likely remain so until demand shows material improvement. The scarcity of motive power is interfering seriously with shipments of Sheets and there is general complaint on this account. It is intimated that in exceptional cases fixed prices of Sheets are being slightly shaded, but this has not been verified. In any event the Sheet trade is in an unsatisfactory condition, but it is hoped will soon show improvement. We quote Nos. 22 and 24 Black Sheets, box annealed, one pass through cold rolls, at 2.45c.; No. 26, 2.55c.; No. 27, 2.65c., and No. 28, 2.75c. For small lots the usual advances are charged. We quote No. 26 Galvanized Sheets at 3.35c., or 75 and 10 off; No. 27, 3.60c., or 75 and 10 off, and No. 28, 3.85c., or 75 and 10 off. All the above prices are f.o.b. at mill.

Ferromanganese.—We continue to quote German Ferro at \$51.50 in large lots and \$52 to \$52.50 in small lots. English Ferro brings slightly higher prices. There is not much doing.

Bars.—The situation in Bars is only fairly satisfactory. Demand is nearly altogether for small lots and the mills are apparently catching up on old contracts and are more eager for business than for some time. Specifications on contracts are not coming in as freely as desired. Should present conditions continue some of the mills will probably be short of work before long. In Iron Bars the situation is the same as in Steel. We note, however, that prices are being very well maintained. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10c. per lb. extra. Quantities less than 1000 lbs., 0.30c. per lb. extra, the total weight of a size to determine the extra regardless of length. We quote Iron Bars at 1.80c. to 1.85c. in carloads and 1.90c. in small lots, f.o.b. Pittsburgh, half extras as per National card.

Plates.—The situation in Plates remains the same as noted in our report of last week. Large consumers advise us that prompt deliveries are very difficult to obtain and the situation in this respect is not likely to improve for some time, owing to the fact that the mills are filled up for months ahead. The wonderful activity in the Steel car trade is causing an enormous consumption of Plates, and the same is true of the boat building industry. All the mills are sold up for anywhere from two months to six months ahead. Prompt deliveries of Plates command from 1.85c. to 2c., Pittsburgh. Official prices, which govern extended deliveries only, are as follows: Tank Plate, 1/4 inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms, net cash in 30 days.

Spelter.—Prompt Spelter continues to command from 5.28 1/2c. to 5.31 1/2c., Pittsburgh. Futures are about 5.27c. to 5.30c., Pittsburgh.

Hoops and Bands.—A moderate amount of tonnage is being placed and we are advised that fixed prices are well maintained. We quote as follows: Cotton Ties, 94c. a bundle for early delivery; Hoops, 1.90c. for 250-ton lots and

over and 2c. in carloads; Bessemer Bands are 1.60c., half extras, Standard Bar card, while for Open Hearth stock \$2 per ton advance is charged.

Structural Material.—While a great deal of work is in sight, yet there is some uneasiness as to the future owing to the arbitrary attitude of many of the labor unions. Capitalists who contemplated putting up large structures are seriously hesitating, owing to the high prices of material and labor and the strict conditions demanded by the unions. Just how much of this contemplated work will ultimately be placed cannot be stated at this time. The Wabash Railroad, which is building a line into this city as fast as possible, will soon be in the market for a good deal of material. Beams and Channels continue very scarce for prompt delivery, but deliveries on Angles are very much better. Prompt Beams and Channels continue to bring from 2 1/2c. to 3c. Official prices for extended deliveries are as follows: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.85c.

Skelp.—Demand for Skelp is quiet, and prices weak. With Gray Forge Iron on the basis of \$21.50 to \$21.75, Pittsburgh, there is certainly not much profit in rolling Iron Skelp at present prices. We quote Grooved Iron Skelp at 1.95c. and Sheared at 2.05c., delivered, Pittsburgh. It is possible our price on Grooved might be shaded on a very desirable specification. Grooved Steel Skelp is held at about 2.05c. and Sheared at 2.10c. to 2.15c., Pittsburgh.

Merchant Pipe.—The anticipated announcement of a reduction in prices of Pipe has been made by the National Tube Company, that concern having sent out under date of November 12 new discounts, which on certain kinds of Merchant Pipe show a material reduction in prices. Small mills that have to buy their Skelp on the basis of 1.90c. to 1.95c. will hardly be able to compete at the lower figures. Pipe mills that are self contained, having their own supply of Skelp, will no doubt meet these prices. In explanation of this change in the price of Merchant Pipe the leading interest calls attention to the fact that the winter season price of last year on Iron Pipe was practically the same as the new rates; that the demand which set in on or about March 1 was so enormous that they found it necessary to raise their prices. They are now able, on account of slackening demand, which is usual at this time of the year, to get back to the values of last winter, and they consider the time opportune to institute the policy of quoting Iron and Steel on the basis of the cost of each, rather than, as heretofore, on the basis of a fixed differential. This will account for the fact that Steel Pipe is now quoted at somewhat lower rates than were current last winter. The Pittsburgh basing discounts for carloads are as follows:

	Carloads.		Merchant Pipe, Guaranteed	
	Black.	Galv'd.	Black.	Galv'd.
	Per cent.	Per cent.	Per cent.	Per cent.
3/8, 1/2 and 5/8 inch.....	68	58	65	55
3/4 inch.....	70	60	67	57
7/8 to 6 inches.....	75	65	72	62
7 to 12 inches.....	73	63	70	60
Plugged and Reamed:				
1 to 4 inches.....	73	63	70	60
Cut 3 to 6 feet:				
3/8, 1/2 and 5/8 inch.....	63	52	60	49
3/4 inch.....	65	54	62	51
7/8 to 6 inches.....	71	60	68	57
7 to 12 inches.....	69	57	65	54
Cut 6 feet and longer:				
3/8, 1/2 and 5/8 inch.....	64	53	61	50
3/4 inch.....	66	55	63	52
7/8 to 6 inches.....	72	61	69	58
7 to 12 inches.....	70	58	66	55
Extra Strong, Plain End:				
3/8 to 8 inches.....	69	59	65	55
Threads only.....	Same as Plain End, plus 1 1/4 per cent., net.			
Threads and Couplings.....	Same as Plain End, plus 2 1/2 per cent., net.			
Double Extra Strong, Plain End:				
3/8 to 8 inches.....	61	51	57	47
Threads only.....	Same as Plain End, plus 2 per cent., net.			
Threads and Couplings.....	Same as Plain End, plus 3 per cent., net.			

NOTE.—Orders for less than carloads will be charged at 12 1/2 per cent. advance. Extra and Double Extra Strong cut lengths, lower random discounts by 10 per cent. net for 6 feet and longer, and 15 per cent. net for 3 to 6 feet.

We may note that the demand for Merchant Pipe in the past month has been considerably better, and the leading mills are fairly well filled up.

Merchant Steel.—Demand is only moderate, but specifications on old contracts are coming in at a fairly satisfactory rate. Mills are having difficulty in making prompt shipments, owing to the shortage of cars and motive power. Shipments from mill are quoted as follows: Tire, 2.15c. to 2.25c.; Spring, 2.25c. to 2.35c.; Toe Calk, 2.30c. to 2.40c., base; Sleigh Shoe, 2.15c. to 2.25c. Differentials are as follows: Less than 2000 lbs. of a size and not less than 1000 lbs., 10c. advance; less than 1000 lbs. of a size, 30c. advance; Cold Rolled Shafting is 47 per cent. off in carloads and 42 per cent. in less than carloads delivered in territory east of

the Mississippi and north of the Ohio rivers. Tool Steel is 6¼c. to 10c. for ordinary grades and 12c. and upward for special grades.

Boiler Tubes.—We note a heavy demand for Tubes, most of the mills being sold up for two weeks to six or eight weeks. Prices are very firm, and discounts on Iron Boiler Tubes are as follows:

Iron Boiler Tubes.

1 to 1½ inches and 6 to 13 inches.....	36½ %
2¼ to 3 inches.....	45½ %
1¾ to 2½ inches.....	35½ %

Coke.—We note a very active demand for Coke, and a number of contracts, both for Furnace and Foundry Coke, have been placed since our last issue. One contract calling for 150 to 200 tons a day of Furnace Coke running through all next year is said to have been placed on the basis of \$3.75 a ton at oven. Contracts for Furnace Coke range from \$3.50 to \$4 a ton at oven, and on Foundry from \$4.50 to \$5 at oven. The movement of Coke is still very unsatisfactory, both to the Coke operators and the furnaces. As we have repeatedly stated, the trouble is shortage of motive power, which prevents getting service out of the cars. Prices on prompt Coke are not as high as they were, nor is the demand so urgent. It looks as though there would be an active Coke market for some time, and the producers will be able to market their product at prices that will allow a very satisfactory profit. Production is very heavy, and last week the Upper and Lower Connellsville regions turned out over 300,000 tons.

Iron and Steel Scrap.—The market on Old Material is quiet, and prices are softer than for some time. The lessened activity among some of the finishing mills is causing a decreased consumption of Scrap, and there is more pressure on the part of dealers to sell. We quote Heavy Melting Stock at \$21 in gross tons; No. 1 Cast Scrap, \$19; No. 1 Wrought Iron Scrap, \$20.50 in net tons; Cast Iron Borings, \$11.50 in gross tons; Old Iron Rails, \$25 to \$25.50 in gross tons.

New York.

NEW YORK, November 12, 1902.

Pig Iron.—The demand is sufficiently strong to absorb everything available. Furnacemen have very little Iron for sale for the next six months, but occasionally a furnace is blown in whose product has not all been sold in advance. The general Foundry trade is purchasing less foreign Iron now, as the Eastern furnaces are gradually getting in better shape to supply their wants, but Pipe foundries are said to have recently bought considerable quantities abroad. Orders could be secured for delivery in the last half of next year, but furnace companies are generally discouraging commitments so far in the future. Prices are very irregular, depending on the necessities of the buyer and the time of delivery. For the first half of 1903 the following quotations are made: Northern Iron, at tidewater, No. 1 X, \$23.75 to \$24.75; No. 2 X, \$22.50 to \$22.75; No. 2 Plain, \$21.50 to \$21.75. Tennessee and Alabama brands, in New York and vicinity: No. 1 Foundry, \$24 to \$24.50; No. 2 Foundry, \$23.50 to \$24; No. 3 Foundry, \$22 to \$22.50.

Steel Rails.—Enough business is now in sight to take up the entire capacity of the mills for the remainder of 1903, the best delivery offered by any mill being September, some being sold up beyond that. Important railroad systems which have been postponing their purchases for next year have opened negotiations the past week. Those who must have Rails in the summer months will probably be obliged to import them. Foreign Rails can now be laid down at New York, duty paid, at \$31.50. We quote \$28 at Eastern mills for Standard Sections.

Finished Iron and Steel.—Nothing of special importance has transpired during the week. Western railroads are contracting quite freely for bridges for next year, but no very large quantities have come to light. Local building enterprises are slow to develop to the contracting stage. Some that have been under consideration are reported to have been postponed for an indefinite period in the hope of reducing the cost of erection. We quote, at tidewater, as follows, but for small lots and prompt delivery higher prices are being obtained for Structural Material and for Plates: Beams, Channels and Zees, 2c. to 2.25c.; Angles, 2c. to 2.25c.; Tees, 2c. to 2.25c.; Bulb Angles and Deck Beams, 2.10c. to 2.25c. Sheared Steel Plates are 2.10c. for Tank, 2.20c. for Flange, 2.35c. to 2.40c. for Fire Box. Refined Bars are 1.90c. to 2c.; Soft Steel Bars, 1.85c. to 2c. Foreign Beams are 1.75c. and Angles 1.80c., ex-ship, New York, in large lots.

Old Material.—The Eastern demand for mill stock is still unsatisfactory, and but for the demand from the West the market for Old Material would be demoralized. The Western demand is so good that prices in this locality are holding up better than expected. Relaying Rails occupy the strongest position in Old Material. No new Rails can now be had until late in 1903, and the quantity of Rails

being taken up is quite small. Light Relaying Rails are very scarce and command a good premium. Wrought Scrap is slightly lower, and no demand is found for Light Iron. Pipes, Turnings and Borings are holding up well, because of the Western demand. Old Iron Rails and Re-rolling Steel Rails are not plentiful and are steady in price. A small lot of Iron Rails was sold at \$24.50, Buffalo delivery, to be applied on an old order. Car Wheels are in urgent demand, but prices have not advanced. Cast Scrap is active. The mills generally are so well supplied with orders that dealers do not look for any considerable decline in Scrap prices, although they consider the "edge" off the market. Selling quotations are as follows, per gross ton, f.o.b. cars in this vicinity:

Old Iron Rails.....	\$23.00 to \$23.50
Old Steel Rails, long lengths.....	21.50 to 22.00
Old Steel Rails, short pieces.....	19.00 to 19.50
Relaying Rails, heavy sections.....	29.00 to 30.00
Relaying Rails, lighter sections.....	33.00 to 35.00
Old Car Wheels.....	20.00 to 20.50
Old Iron Car Axles.....	27.00 to 28.00
Old Steel Car Axles.....	25.00 to 25.50
Heavy Melting Steel Scrap.....	19.00 to 19.50
No. 1 Railroad Wrought Scrap Iron.....	21.00 to 22.00
Track Scrap.....	19.50 to 20.00
Busheling Scrap.....	15.00 to 16.00
No. 1 Machinery Cast Scrap.....	19.00 to 20.00
Stove Plate.....	13.00 to 14.00
Wrought Turnings, delivered at mill.....	16.50 to 17.00
Cast Borings, delivered at mill.....	10.00 to 10.50

Boston Machinery Market.

BOSTON, MASS., November 8, 1902.—Boston dealers in machinery and machine tools report excellent business with all indications pointing toward a busy winter. During the past month there have been no "glory" orders, as one dealer termed it, but their absence does not cause any mourning, as the vigorous competition therefor makes them unprofitable. There have been many buyers of machinery in the market, with few machines wanted by each customer, the demand coming from all parts of the country, denoting a healthy state of business. The demand has not been confined to any special line, but has covered a wide range. During the summer dealers generally bought in a "hand to mouth" manner for present needs, and did not attempt to increase their stocks, and, as mentioned in previous letters, this has enabled manufacturers to catch up on their orders. There have been a goodly number of inquiries well distributed over the range of machines and tools. There is still quite a scarcity of heavy machinery, especially planers, but so far it has not had a very noticeable effect on business. The complaints of losing customers, owing to delays in filling orders, are heard no more.

One firm doing an extensive business state that October was their best month of 1902, and that they expect heavy trade during the remainder of the year. Another firm reports satisfactory orders during October, including one for 80 lathes.

For once a Congressional election had no deterrent effect upon business. Some dealers claim that the election excuse is generally used by parties who would not buy any way. Some dealers contend that business would be much better had the coal strike been settled during the summer, and they certainly have strong arguments to sustain them in this view in the fact that, owing to the uncertainty regarding coal prices many people were deterred from making their business plans for the coming winter, and others found themselves hampered by a lack of coal.

The dealers in second-hand machinery have little to say beyond mentioning that they are very busy and see no reason to feel apprehensive regarding the outlook. All in all, the buying indicates excellent business conditions, with no signs of a change.

R. R. Sherman & Co. have rented a large storehouse in Chelsea, Mass., their previous facilities not proving sufficient for their business. A spur track from the Boston & Maine Railroad runs to their new storehouse, which will save them many heavy carting bills.

The Boston Transit Commission has awarded the contract for structural steel for the East Boston Tunnel Station at the Old State House. The bidders were the Boston Steel & Iron Company, \$115.20 per ton; the American Bridge Company, \$111.90 per ton; H. P. Converse & Co., \$99.50 per ton; the New England Structural Company, \$98 per ton; the Berlin Construction Company and the Eastern Bridge & Structural Company, each \$90 per ton; the Belmont Iron Works, \$73.45 per ton; the G. W. & F. Smith Iron Company, \$69 per ton. The contract was awarded to the G. W. & F. Smith Company, who must furnish the material within three months. The work of installing three air locks to furnish compressed air for the Boston end of the tunnel will be begun the first of next week. This installation will require about three weeks, during which time there will be a suspension of work on the construction shield. About 150 feet of the tunnel between the State street shaft and the tunnel has been completed.

The United States Car & Vehicle Company, organized at Portland, Maine, have filed a certificate of organization with

the Maine Secretary of State. The capital is \$1,000,000. John M. Burton of Boston is president and Charles W. Coolidge, Jr., of Manchester, N. H., is treasurer. The company will manufacture railroad coaches, which can be transformed from day into sleeping cars. They will be largely made of steel.

The Steel Cable & Engineering Company have purchased and are now occupying the Preston Hose & Tire Company's factory at Everett, Mass. The purchase price was \$10,500.

The New Home Sewing Machine Company are preparing to erect a four-story brick building for their needle manufacturing department at Orange, Mass.

A syndicate of Boston and New York men are preparing to utilize the water power in the Union River, near Ellsworth, Maine. It is believed that the power will be sufficient to generate 40,000 horse-power of electricity, which can be transmitted to points between Bar Harbor and Bangor.

The George A. Fuller Company of Boston have obtained the contract for erecting the Standish Building on Boylston street, 52 x 90 feet, and six stories high.

In the court of Land Registration the American Tube Works Company have petitioned for a Torrens title for some 40 acres of land on Quincy avenue and the Weymouth Fore River at Braintree, Mass., where they will erect a large manufacturing plant.

During November the Ashton Valve Company will pay a quarterly dividend of $1\frac{1}{2}$ per cent.

Metal Market.

NEW YORK, November 12, 1902.

Pig Tin.—Fluctuations have been considerably wider during the last week than for some time past. The market at this writing is a little higher than it was last week on spot, but somewhat lower on futures. The speculative element in London led the proceedings of the week, and while they were closely followed in this market the amount of business was very light here. From consuming interests the demand is considerably smaller than for some weeks. As an illustration we might cite a number of consumers who have been ordering recently in lots of from 5 to 10 tons and who are now buying but from 1 to 3 tons. This and other general conditions indicate that there is very little confidence in the market. Closing prices to-day were as follows: Spot, 26.20c. to 26.40c.; November, 25.50c. to 25.65c.; December, 25c. to 25.45c. The London market has shown a net decline throughout the week. At present spot is quoted £116 and futures £114 10s. This is a decline of £2 12s. 6d. for spot and £2 10s. for futures. Arrivals amount to 915 tons and afloats 1939 tons.

Copper.—Business in this market is still extremely dull and no encouraging reports have as yet been forthcoming. Prices are in buyers' favor, but consumers are purchasing warily. The rod and wire business is said to be very quiet and requirements from manufacturers in these lines are light. It is reported in the trade that some of the large wire mills are running but five days per week. Exports thus far this month amount to about 4200 tons. For spot to February delivery the market for Lake is quoted 11.50c. to 11.70c. Electrolytic and Casting are both quoted 11.30c. to 11.50c. and Standard nominally 10.75c. London declined almost £1 to £51 5s. for spot and £51 10s. futures. Best Selected declined 10 shillings to £55.

Pig Lead.—The market is still dull and without an interesting feature. It is rumored that the parties endeavoring to consolidate the large consumers are meeting with difficulties, and that there is a possibility of the merger falling through. No official information can be had on this subject at this time. The official quotations are still based on 4.12½c. for spot Desilverized and 4.10c. for futures. The London market advanced a shade to £10 13s. 9d.

Spelter.—Prices have eased off considerably, and business is very dull. Spot is now quoted here 5.30c. to 5.40c., while shipments from the West can be had at 5.25c. St. Louis still quotes 5.15c. and London has again advanced a shade to £19 10s.

Antimony.—The market is lower, Cookson's having declined to 9c. to 9½c., Hallett's to 7¼c. to 7½c. and other brands 7c. to 7¼c.

Nickel.—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and terms of order. Smaller lots are quoted as high as 60c., according to quantity.

Quicksilver.—The market is quiet and unchanged, the ruling quotations being \$48 per flask of 76½ lbs., each in lots of 50 flasks or more. London is unchanged at £8 15s.

Tin Plate.—An increased amount of business is reported by the American Tin Plate Company at the new quotation, which is on a basis of \$3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, and \$3.79, f.o.b. New York. Representatives of outside mills are also reaping the benefits of lower prices, it being said that in some instances they have shaded the price of the American Tin Plate Company.

The New York Machinery Market.

NEW YORK, November 12, 1902.

Within the last few days the greatest strides made in this country in the introduction of the steam turbine were taken. We are advised through good sources that the General Electric Company have just closed negotiations with three of the most prominent electrical concerns in this country for the installation of their new turbines. The New York Edison Company, who are finishing the equipment of their great "Waterside" station at Thirty-sixth street and First avenue, New York, have arranged for the installation of a machine calculated to develop about 8000 horse-power. This installation will be an important one, as there are now eight large reciprocating engines running in this station and orders were recently awarded for three more. The turbine will thus have an excellent opportunity of proving its efficiency, especially as the engines are provided with special Wainwright feed water systems, which, together with the generally excellent engine equipment, is producing flattering results. It is the opinion of the trade that in this plant the generation will be afforded a rigid test.

Another significant turbine plant will be furnished by the General Electric Company to the Massachusetts electric companies who control a number of electric railways and operate some 18 power stations in the vicinity of Boston. This plant, we are informed, will include ten turbine sets, to develop about 2000 horse-power each. The report in the trade states that this plant is to be located at Danvers and will ultimately be enlarged so as to consolidate several of the present isolated power stations. The new station is to be a central high tension house. It is also reported that the General Electric Company have contracted to install either two or five very large turbine sets in the power plant of the Edison Electric Illuminating Company of Boston, commonly known as the Boston Edison Company. The report has it that these machines are expected to develop approximately 10,000 horse-power each. It is understood in the trade that the Schenectady works of the General Electric Company are being fitted as rapidly as possible for the production of turbines on a large scale. It was with this object in view that the heavy purchases of machine tools recently referred to in this column were made. Aside from the standard machines purchased contracts were given to the Newton Machine Tool Works, Limited, of Philadelphia and the projectile department of the E. W. Bliss Company of Brooklyn for special machines for milling out the buckets employed in the construction of the turbines. In addition to the concerns already mentioned as having received some of the machine tool orders the Bullard Machine Tool Company of Bridgeport, Conn., obtained a good share. The Fairbanks Company, through their Albany house, closed for a number of lathes, shapers and drills also.

Machine tool merchants are looking for a good sized list of specifications from the American Bridge Company, who are to enlarge their plant at Ambridge, near Economy, Pa.

The plant of the Westinghouse Electric & Mfg. Company at Newark, N. J., is being enlarged and purchases are being made.

There is an inquiry out for sub-bids on a 2000 horse-power equipment to be installed at Harrison, N. J. The General Electric Company have the matter in hand.

Private advices just received state that the consolidation of large electric companies in Southern California has been consummated, and that arrangements will now be made for the development of 40,000 additional horse-power. The new company are to be known as the Edison Electric Light Company, and they will operate chiefly in Los Angeles, Pasadena, Santa Anna and Redlands. The present power is almost all obtained from hydraulic plants in the Kern River Canon and the Santa Anna Canon.

The Narragansett Electric Lighting Company, Providence, R. I., are installing a complete equipment of Roney stokers, comprising 12 stokers of the quadruplex type operating under Babcock & Wilcox boilers of 4500 horse-power.

The Lowell, Mass., 1500 horse-power electric lighting engine order was awarded to the Brown Engine Company, Fitchburg, Mass.

The Benjamin F. Shaw Company of Wilmington, Del. are remodeling the plant of the Baltimore Rolling Mills at Baltimore, Md., and are buying the equipment.

R. T. White of 140 Nassau street, New York, is purchasing the equipment for a copper smelting plant, to be erected at foot of Eighth street, Bayonne, N. J. The contract for the steel buildings has been awarded to the Berlin Construction Company and the engine order went to Woolston & Brew of 39 Cortlandt street, who will install a Ball engine of 150 horse-power.

The 1200 horse-power engine order in connection with the new Paxon power plant, to be built at Harrisburg, Pa., was awarded to the Fulton Iron Works.

The Barber Asphalt Company of 11 Broadway, New York, who are erecting a plant near Perth Amboy, N. J., awarded a contract to the Green Fuel Economizer Company of 74 Cortlandt street for a 1000 horse-power economizer equipment. The latter concern also received an order from

the Rome Brass & Copper Company of Rome, N. Y., for a 500 horse-power equipment.

The John Simmons Company, 110 Centre street, New York, and Newark, N. J., are in the market for a 75 horse-power engine, 100 horse-power boiler, pipe threading machines, lathes, &c. The company are erecting a new forge shop at Murray street and Avenue D, Newark, and will increase their equipment by the addition of the latest machines for the bending and coiling of iron, brass and copper pipe; also for all kinds of forge work.

What Is Steel?

In these columns a few weeks back was reported a case in which the Stipendary Magistrate of Sheffield, England, had decided that certain forks manufactured of malleable iron, but with 25 per cent. of boiler punchings thrown in, might be actually regarded as steel. It is needless to remark that the English steel experts were immediately up in arms, and Prof. J. O. Arnold, head of the metallurgical department of the University College and well known to American iron and steel producers, has just delivered a lecture on the subject. It is important because in this lecture he attempted to give a definition of steel. The forks sought to be impounded as bearing a false trade description have been analyzed by the Professor, with the following result:

	Per cent.
Iron	94.47
Combined carbon.....	0.16
Graphite	2.88
Silicon	1.52
Manganese	0.70
Sulphur	0.23
Phosphorus	0.04

Steel manufacturers will be interested in having the Professor's definition of steel and his several classifications. After a clever display of dialectics the Professor asked, Is it possible from data such as have been given to say what is steel, so as to obtain a sharp, legal definition which will unerringly distinguish genuine steel from its spurious imitations? He reluctantly came to the conclusion that not one of four methods of distinction—chemical, mechanical, physical, or microscopical—was capable of always distinguishing the false from the true. Chemically, Sanderson's 1843 forks were steel, but, as a matter of fact, the material was really malleable cast iron. The chemical compositions of steel and of malleable cast iron hopelessly overlapped. Again, the tensile tests obtained from certain steels and from some varieties of malleable cast iron were so similar that any attempt to distinguish one from the other on mechanical data was out of the question. Physical classification was misleading, since certain varieties of malleable cast iron hardened, tempered and let down just like steel. Certain malleable iron castings were microscopically identical with certain steels. There was, however, a way round to obtain a legal definition of steel. The key to the position might be expressed in the word "process," and on this basis he had prepared a classification which sharply defined all the finished materials produced in iron and steel metallurgy. The proposed classification was as follows:

This classification is essentially based on well-established trade terms, which imply that a specific name involves a guarantee that the material to which such name refers was substantially produced by its own specific and recognized method of manufacture.

Malleable Wrought Iron.—The designation "malleable wrought iron" shall apply only to the products obtained by purifying pig iron in the Walloon, Franche Comte, Lancashire Hearth or puddling furnaces, so as to produce malleable sponges or balls, from which are forged, or forged and rolled, blooms (or billets), slabs, bars, plates, sheets or other sections suitable for the manufacture of finished articles. Malleable wrought iron shall be distinguished from malleable cast iron by the fact that it contains unexpressed slag in the form of elongated streaks lying in the direction of the forging or forging and rolling.

Sheared Steels.—Shear or single shear steel faggots, bars or finished articles shall have been manufactured from Swedish malleable wrought iron after such malleable wrought iron has been converted into blistered bar by the process of cementation. Then the blistered bar, after the operation of plating, shall have been pilled and welded into a faggot, which faggot shall ultimately have been rolled or hammered into bars or shapes suitable for the production of finished articles. Double shear steel, faggots, bars or finished articles shall have been produced by nicking into two portions a faggot of single shear steel and then welding the said portions into one faggot, which faggot shall ultimately

be rolled or hammered into bars or shapes suitable for the production of finished articles.

Cast Steel.—The words "cast steel" on blooms (or billets), slabs, bars, plates, sheets or finished articles shall be deemed a guarantee that the material from which such blooms (or billets), slabs, bars, plates, sheets or finished articles were made was cast to a fluid condition from a crucible into an ingot, and that such ingot was afterward forged or rolled or forged and rolled, into the said blooms (or billets), slabs, bars, plates, sheets or into other sections suitable for the manufacture of the said finished articles.

Steel.—The word "steel" on blooms (or billets), slabs, bars, plates, sheets or finished articles shall be deemed a guarantee that the material from which such blooms (or billets), slabs, bars, plates, sheets or finished articles were made was cast in a fluid condition into an ingot, and that such ingot was afterward forged or rolled, or forged and rolled into blooms (or billets), slabs, bars, plates, sheets or into other sections suitable for the manufacture of the said finished articles.

Steel Castings.—The term "steel casting" shall imply a guarantee of (1) a casting which, after annealing, shall have undergone only a surface oxidation of its carbon, and in which casting the strength and ductility developed by the operation of annealing shall be mainly due to a re-crystallization of the metal, and not to any considerable oxidation of nor change in the condition of the carbon; or (2) a casting of such chemical composition that such casting possesses initially the amount of strength and ductility necessary for the purpose for which such casting is to be raised.

Malleable Cast Iron.—Articles molded and cast into shape, and then annealed so as to be made more ductile (a) by a complete or partial oxidation of their carbon, or (b) by a change in the condition of their carbon, either alone or accompanied by a partial oxidation of their carbon, shall be defined as "malleable cast iron," and never as cast steel, steel or steel castings.

Exemptions.—The definitions of cast steel and steel shall not apply to special alloys of iron which are most suitable for use in their cast state, and which, therefore, do not require forging or rolling, or both, to produce in such alloys the requisite physical properties for the purposes for which they are employed. Such alloys, when cast from a crucible, may be legally marked either cast steel or steel, and when cast from an open hearth or other furnace, or from a Bessemer or other converter, may be legally marked steel.

He felt sure that after this classification had been fully discussed, probably extended, no doubt amended, but finally adopted in principle, it would form an equitable basis for legislation. Then, if legally authorized and rigorously enforced, it would soon stop, or at any rate greatly check, the practice of false marking. The reference to Mr. Sanderson made by Professor Arnold is to a certain fork made by that gentleman. This fork when cast contained about 3 per cent. of carbon and about two-thirds of this was removed by annealing the article in iron ore for many days, but as this annealing left the outside of the fork soft decarbonized metal it was subsequently casehardened, thus restoring to it a layer of hard carbonized metal capable of taking a fine polish. This particular fork Professor Arnold described as a remarkably good imitation of steel.

Sir Thomas Shaughnessy, president of the Canadian Pacific Railway, strongly advocates a duty on lead to protect home producers. On this subject he expressed his views publicly a few days ago. It has always been the policy of his company, he says, to help the silver-lead mining interests of Southern British Columbia. First, they reduced the freight rates in their favor. This proving of advantage, not so much to them as to United States interests, the company next established a smelter of their own at Trail. This has been of very great advantage to the mines, as it means a reduction of 50 per cent. in the smelting charges and 70 per cent. in the freight, according to Sir Thomas' showing. Later the company established a small electric stamping plant for the production of pig lead, and they now propose to construct four or five additional 10-ton stamping plants, involving an outlay of between \$140,000 and \$150,000. This is the first electrical production of pig lead in Canada, and Sir Thomas reports it perfectly successful. He expresses the belief that the mines can be depended on for an unfailing supply of ore, and holds that the situation calls for a raising of the lead duties of Canada to a parity with those of the United States.

Henry W. Oliver and W. P. Snyder of Pittsburgh have gone to Arizona to look after mining interests in that State.

Pig Production Increased.

The reports we have received from pig iron manufacturers show that the daily average production in October was in excess of that of September. October being a 31-day month, the total figures of production for the month are therefore considerably higher than for September, but not quite as large as they would have been if the coke situation had been satisfactory. As more furnaces were active at the beginning of October than at the beginning of September, and their weekly capacity was 10,000 tons greater, the production would have shown a heavy increase but for the difficulty in securing fuel. This caused much irregularity in operation and several coke furnaces have been blown out to wait until a better supply is seen to be available. The irregularity of operation in October has caused some perplexity in making up the figures of active furnace capacity for November 1. Our figures may be somewhat lower than the yield for November will disclose, especially if the coke supply should materially improve. The output this month may be further increased by the blowing in of a number of idle furnaces in the anthracite districts, now that the miners' strike is over. A few have been started since the first of the month and preparations are being made to start others.

The weekly capacity of the furnaces in blast on November 1 compares as follows with that of the preceding periods:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week.
November 1, 1902.....	337,559	330,110	7,449
October 1.....	345,048	337,837	7,211
September 1.....	335,189	328,243	6,946
August 1.....	336,465	328,745	7,720
July 1.....	350,890	343,250	7,640
June 1.....	344,748	337,492	7,256
May 1.....	352,064	337,627	6,437
April 1.....	337,424	331,140	6,284
March 1.....	323,028	316,039	6,989
February 1.....	332,045	325,440	6,605
January 1.....	298,460	291,992	6,468
December 1, 1901.....	324,761	317,358	7,403
November 1.....	320,824	313,775	7,049
October 1.....	307,982	300,538	7,444
September 1.....	299,861	293,256	6,605
August 1.....	303,847	297,269	6,578
July 1.....	310,950	303,793	7,157
June 1.....	314,505	306,391	7,514
May 1.....	301,125	293,915	7,210
April 1.....	296,676	288,766	7,910
March 1.....	292,899	284,825	8,074
February 1.....	278,258	278,258	8,335
January 1.....	250,351	243,254	7,097
December 1, 1900.....	228,846	222,067	6,779
November 1.....	215,304	207,381	7,923
October 1.....	223,169	214,921	8,248
September 1.....	231,778	223,551	8,227
August 1.....	244,426	236,131	8,295
July 1.....	283,413	274,921	8,492
June 1.....	296,376	288,771	7,605
May 1.....	293,850	286,956	6,894
April 1.....	289,482	281,644	7,838

Production of Pig Iron.—Gross Tons.

	July, 1902.	August, 1902.	September, 1902.	October, 1902.
New York.....	32,816	34,450	28,053	30,105
New Jersey.....	12,880	15,032	10,617	8,375
Schuylkill Valley.....	45,329	39,208	34,417	31,915
Lehigh Valley.....	38,972	38,980	34,224	28,661
Susquehanna and Lebanon.....	49,362	47,332	41,371	37,849
Pittsburgh District.....	356,777	355,524	348,362	380,261
Shenango Valley.....	101,823	104,903	118,827	112,823
Western Pennsylvania.....	90,618	88,943	85,152	83,827
Maryland, Virginia and Kentucky.....	75,770	75,499	80,337	84,759
Wheeling District.....	69,649	74,436	71,897	80,791
Central and Northern Ohio.....	105,463	114,108	107,522	113,842
Mahoning Valley.....	116,175	112,302	105,482	112,978
Hanging Rock and Hocking Valley.....	23,677	27,185	21,668	27,026
Illinois, Wisconsin, Minnesota, Missouri and Colorado.....	200,599	190,989	181,830	189,970
Alabama.....	90,562	120,370	118,669	118,710
Tennessee.....	31,386	29,004	30,172	29,049
	1,441,858	1,468,165	1,418,600	1,470,941
Charcoal pig.....	34,038	30,677	28,834	33,037
Totals.....	1,475,896	1,498,842	1,447,434	1,503,978

The status of the anthracite and coke furnaces was as follows on November 1, as compared with the preceding month:

Coke and Anthracite Furnaces in Blast.

Location of furnaces	November 1.			October 1.		
	Number of stacks.	Number in blast.	Capacity per week.	Number in blast.	Capacity per week.	
New York.....	14	6	6,797	6	6,980	
New Jersey.....	6	4	3,390	3	2,478	
Spiegel.....	3	0	0	0	0	
Pennsylvania:						
Lehigh Valley.....	28	12	6,475	13	7,400	
Spiegel.....	1	0	0	0	0	
Schuylkill Valley.....	14	7	7,189	8	7,882	
Low. Susquehanna.....	10	7	4,503	7	5,418	
Lebanon Valley.....	12	6	3,986	7	4,530	
Pittsburgh Dist.....	33	32	84,542	34	84,410	
Spiegel.....	1	1	553	0	0	
Shenango Valley.....	19	14	22,050	17	27,700	
Western Penn.....	21	15	17,549	16	20,166	
Maryland.....	5	4	6,202	4	5,733	
Wheeling District.....	11	10	18,242	10	16,443	
Ohio:						
Mahoning Valley.....	15	12	23,709	13	23,520	
Cent. and North.....	14	13	25,704	13	25,788	
Hocking Valley.....	3	2	518	2	630	
Hanging Rock.....	11	9	5,607	9	4,907	
Illinois.....	19	16	31,913	16	32,744	
Spiegel.....	1	1	800	1	833	
Minnesota.....	1	0	0	1	1,400	
Wisconsin.....	5	5	4,865	4	4,181	
Missouri.....	1	1	651	1	1,008	
Colorado.....	3	3	4,500	2	3,171	
The South:						
Virginia.....	23	17	10,486	16	10,866	
Kentucky.....	7	6	2,450	6	2,107	
Alabama.....	40	33	28,616	32	29,500	
Tennessee.....	16	14	8,813	15	8,042	
Totals.....	337	250	330,110	256	337,837	

More coke furnaces were blown out in October than were blown in. The stacks blown out were one Warwick in the Schuylkill Valley, Carbon in the Lehigh Valley, one Pennsylvania Steel and one Colebrook in Central Pennsylvania, Claire, Atlantic, Hall and Sharpville in the Shenango Valley, Duquesne in the Pittsburgh district, one Durban in Southwestern Pennsylvania, Radford Crown in Virginia, one Hubbard in the Mahoning Valley, Calumet in Illinois, Zenith in Minnesota, one Bessemer in Alabama and Cumberland and Johnson City in Tennessee.

The anthracite or coke furnaces blown in were one Wharton in New Jersey, one Bethlehem in the Lehigh Valley, one Paxton in Central Pennsylvania, Mabel in the Shenango Valley, Warner in Tennessee, Williamson in Alabama, Sidney in Wisconsin and one Colorado.

The status of the charcoal furnaces was as follows:

Charcoal Furnaces in Blast.

Location of furnaces.	November 1.			October 1.		
	Number of stacks.	No. in blast.	Capacity per week.	No. in blast.	Capacity per week.	
New England.....	7	3	250	3	250	
New York.....	3	2	676	1	511	
Pennsylvania.....	5	2	90	2	90	
Maryland.....	1	0	0	0	0	
Virginia.....	3	2	98	2	98	
Ohio.....	8	4	226	5	380	
Kentucky.....	3	0	0	0	0	
Tennessee.....	1	0	0	0	0	
Georgia.....	4	3	882	3	882	
Alabama.....	5	5	1,778	4	1,400	
Michigan, Missouri and Wisconsin.....	10	8	3,199	7	3,350	
Washington.....	1	1	100	1	100	
Texas.....	4	1	150	1	150	
Totals.....	55	31	7,449	29	7,211	

Of the charcoal furnaces, two were blown out and four were blown in. The former were Bloom and Center in Ohio. The latter were Copake in New York, Vesuvius in Ohio, Manistique in Michigan and Attalla in Alabama.

The position of furnace stocks, sold and unsold, as reported to us, was as below on November 1, as compared with the five preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

	Stocks.	June 1.	July 1.	Aug. 1.	Sept. 1.	Oct. 1.	Nov. 1.
Anthracite and Coke.....	57,231	61,312	64,059	63,666	62,651	62,261	
Charcoal.....	15,977	13,725	13,071	15,873	13,250	9,597	
Totals.....	73,208	75,037	77,130	79,539	75,901	71,858	

Iron and Industrial Stocks.

Holders of stocks have had an unpleasant experience the past week. While the result of the elections was satisfactory to financial interests the stock market did not respond to the presumably favorable conditions and liquidation set in which became violent on Saturday and continued on Monday.

It was assisted by rumors on Saturday that a large New York financial institution was in difficulties. This proved incorrect, except the development that the Trust Company of the Republic had found it advisable to secure the assistance of a syndicate to take over securities of the recently formed United States Shipbuilding Company. It is stated that neither the Trust Company nor the Shipbuilding Company will be embarrassed. It is further stated that the stock of another of the smaller consolidations recently formed had not met with the favor expected at the hands of the investing public, and that the underwriters have been obliged to return a considerable portion of the securities to the subscribers instead of marketing them. The liquidation was not confined to the stocks of the companies directly concerned, but took in even the best industrials, doubtless because holders of such securities were forced to realize to protect other interests.

The liquidation continued on Tuesday and extended into Wednesday, carrying many stocks down to very low prices. Steel common sold below 36, preferred below 83, Tennessee below 55, Republic common at 18, preferred at 75, Locomotive common at 26, Car & Foundry common below 34, and so on through the list.

The Cramp Shipbuilding & Engine Company's directors decided last week to pass the next regular quarterly dividend of 1½ per cent., on the ground that the company would much better discontinue paying dividends while borrowing money. A director is quoted as stating that the retention of the dividend money, which amounts to less than \$250,000 per annum, will not of itself supply the capital desired, so as to avoid a new bond issue, but there is a good deal of money owing to the company by the Government on contract work, which is necessarily slow in coming in, and the company's earnings can be used to advantage as working capital at this time. Since the close of the last fiscal year, April 30, 1902, the net profits of the business ahead of interest requirements have been larger than recent years, and the prospects for business in 1903 are excellent.

A very full statement of the condition of the United States Steel Corporation showing not only continued increases in earnings, but also in orders on hand, has been made public. The statement is the regular statement made to the Board of Directors, but it has not heretofore been the custom to publish it.

The statement shows:

	1901.	1902.
Earnings September and October...	\$21,478,585	\$24,130,846
Increase, \$2,652,261.		
Cash on hand November 1.....	63,961,973	64,748,966
Increase, \$786,993.		
Cash assets October 1.....	201,842,384	222,629,350
Current liabilities October 1.....	77,693,371	65,142,457

Net current assets October 1.....\$124,149,013 \$157,486,893

The increase in net current assets is \$33,337,880.

Regarding the business being done by the Corporation, the statement shows:

	1901.—Tons.	1902.—Tons.
Orders on hand November 1.....	2,831,692	4,968,002

The orders entered since the last meeting of the board were 934,050 tons. The shipments entered since the last meeting of the board amounted to 831,341 tons.

The International Steam Pump Company have brought suit to recover from Henry R. Worthington a large number of patents issued in foreign countries and others pending here and abroad. The company are also seeking to recover from Mr. Worthington about \$1,200,000 worth of stock, which, they allege, was issued to him without consideration. In suing for the stock the company say Mr. Worthington was president of the company from 1893 to 1900, and during that time used his skill in developing machinery perfected and invented by him and other employees, but the money used by him in perfecting inventions and obtaining patents was paid by the company. These patents were issued in his name and were later claimed by him, though the company declare it was understood all such patents should be the property of the company. In return for the new patents the directors of the company voted and transferred to Mr. Worthington stock valued at \$1,293,198. The company demand the return of the stock on the ground that the patents for which the stock was given in payment were rightfully the property of the company. Mr. Worthington replies that the patents contested for are his personal property and not those of the Worthington corporation or of the International Steam Pump Company. The company lay claim to 226 patents and applications for patents, most of which are in foreign countries.

Dividends.—The Pratt & Whitney Company have declared their regular quarterly dividend of 1½ per cent. on the preferred stock, payable November 15.

The Niles-Bement-Pond Company have declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable November 15.

The Lowell Machine Shop, Lowell, Mass., have declared a dividend of \$25 per share, payable November 15.

Canadian News.

A Campaign of Tariff Education.

TORONTO, November 8, 1902.—The Canadian Manufacturers' Association is using its influence to educate the public into a preference for Canadian articles and to create a protectionist sentiment throughout the country. Evidences of its activity appear in the advocacy by certain newspapers, usually anti-protectionist, of the doctrine, "Canada for the Canadians." On the 14th of last month a circular letter was sent out by the executive to the individual members of the association, the object of which was to put the sense of the association on the tariff question. This caused some comment among free trade newspapers, and the association was accused of mixing in politics. Two other circulars have since been issued explanatory of the first and denying that the association was taking part in politics. These declarations were drawn forth by a statement in the Ottawa correspondence of the Toronto *Globe*, the chief ministerial organ, thus worded:

"We, the undersigned, hereby severally subscribe for and covenant and agree with the Canadian Manufacturers' Association to pay to said association the said amount set opposite our respective names hereunder in three equal consecutive annual payments (a first payment to be made within 30 days after sending of notice by said association that the fund has been subscribed) toward a fund of \$50,000 to be used by said association in an educational campaign to impress upon Canadians the advantages of conserving and developing Canadian industries and maintaining, as far as practicable, the home market for Canadian manufacturers." The foregoing is the wording of a guarantee form which has been sent to Canadian manufacturers, and to which many signatures have been appended.

Discussing the tariff circular of the association, the *Globe's* Ottawa correspondent said that he was given to understand it contained proposals to raise the duties on pig iron, bar iron, steel billets, steel plates and iron and steel generally. He quoted a manufacturer, whose raw material is iron and structural steel, who said that he had been induced to come to Canada and establish his industry, which now employed nearly 3000 hands, by the fiscal policy of the present Government, who favored only a moderate duty on iron and steel, and he would not have embarked capital in his Canadian manufactory under the former tariff, or if he supposed there would be an increase in the present iron and steel duties. Such an increase, he said, would leave him at the mercy of a few Canadian producers of iron and steel, who would naturally combine and put the price up as high as the tariff would allow. Asked if this objection would not be overcome if the duty was also raised on his manufactured articles, he said: "No; it would be impossible for him to increase the price on his output to the purchasers, and if the iron and steel duties were raised it would practically close up his business."

Iron and Steel Works for Toronto.

Negotiations are under way for the establishing of large iron and steel works in Toronto. Ashbridge's marsh will be utilized for a site if a suitable agreement can be arrived at. So far the names of the principals on the other side have not been announced, but they are said to be men from New York, Boston, Montreal, Toronto and Hamilton. The promoters ask for a 30-year lease at a nominal rental of the old dry dock property and 15 acres of marsh land to the east of it. To enable ore and other supplies to be landed they also require that a 14-foot channel be provided in the portion of the harbor leading to the marsh, and that the Don River be dredged to a like depth for the necessary distance. A railway switch across the Don is another of the things desired. On the company's part it is proposed to erect buildings at a cost of \$150,000, and to pay out in wages \$75,000 a year. Raw material is to be brought from Nova Scotia.

In the New Ontario Mineral Belt.

Considerable geological field work was done during the past season by the staff of the Ontario Bureau of

Mines. Prof. A. P. Coleman made a detailed examination of the Sudbury nickel area. Prof. W. G. Miller, Provincial Geologist, investigated deposits of various kinds northeast of Sturgeon Lake, in the Thunder Bay district. Later he spent some time in a further study of the iron ore regions of Northern and Northwestern Ontario, including part of the territory traversed by the Canadian Northern Railway and by the Port Arthur, Duluth & Western Railway, as well as points contiguous to the main line of the Canadian Pacific Railway. He has just finished a trip down the Mississauga River, the lower portion of which runs through the copper district north of Lake Huron, to which district he has been able to give some attention. He is now engaged in inspecting the working mines in Northwestern Ontario. He reports that Americans are keenly watching developments and looking into possibilities in the iron ore situated on this side of the line. An American expert is sure to turn up on the first news of a discovery of an iron ore body.

L. L. Bolton, another member of the staff, explored the country north of the new Temiscamingue townships as far as Lake Abitibi. He reports the region to be largely of the Huronian formation, and finds the general indications very favorable for iron ore. At present the Bureau of Mines has in hand a report on the subject of peat fuel, prepared by W. E. H. Carter.

Nickel Copper Company of Ontario.

Litigation against the Nickel Copper Company of Ontario, whose head office and chief works are at Hamilton, has ended in a compromise under the terms of which the company are to convey to a trustee all their mines in the Sudbury districts, and their other assets, to settle with all their creditors and to pay into the courts any surplus that may remain. In one suit, Henry Totten and C. E. Mitchener, the latter of Ohio, sought an order for the winding up of the company; in another Mr. Totten got an injunction restraining further proceedings in regard to an alleged unauthorized loan of \$65,000; in a third case Peter Ryan secured an injunction preventing a meeting of directors to validate this loan; C. H. Hanland, Cleveland, was proceeding in another action to have set aside the alleged fraudulent issue of \$3,500,000 stock. The company's authorized capital is \$10,000,000. Senator Wood of Hamilton was president; James Dixon of Hamilton, vice-president; J. R. Moodie of Hamilton, treasurer; John Patterson of Hamilton, secretary; Charles E. Rietchie, Akron, Ohio, and J. A. Rammerer of Toronto, managing director, being the other members of the board.

An English View of the World's Production.

An interesting editorial article appears in a recent issue of the *London Iron and Coal Trades' Review*, relating to the world's production of iron and steel. We reproduce the greater portion of the article, as follows:

It is desirable that the increasing magnitude of the interests that are controlled by and dependent on the iron and steel industries should be kept steadily in view, not by those only who are engaged in those industries, but by the people as a whole. The total make of pig iron in the world half a century ago was under 5,000,000 tons. In the present year the output is likely to be 41,000,000 tons. In other words, we have made eight-fold more progress during the last 50 years than we did in the whole of the previous history of the world. If we go back to the year 1800 the advance of recent years becomes still more remarkable, for at the beginning of the nineteenth century the total world's make of pig iron was not a million tons, so that we have made 40-fold more progress in the last 100 years than we had done in all previous recorded history. The United States has, of course, been the great record beater since 1890, when it first got ahead of our own country, although ten years before we not only produced twice the quantity credited to the United States, but also nearly one-half of the total iron output of the world. The figures which record the movements of iron output, both during and subsequent to these periods, are so striking that we present them in the following tabulated form, in metric tons:

Total Output of Pig Iron by Leading Countries, in Metric Tons.

	1880.	1890.	1900.	1901.
United States.....	3,896,554	9,349,943	14,009,624	16,133,461
Great Britain.....	7,800,266	8,030,374	9,052,107	7,804,766
Germany and Luxembourg.....	2,729,038	4,658,451	8,520,541	7,860,893
France.....	1,725,293	1,962,196	2,699,494	2,400,240
Belgium.....	624,302	829,542	1,018,507	1,024,576
Austria-Hungary....	750,134	945,775	1,475,000	1,408,210
Russia.....	448,411	926,482	2,925,600	2,816,800
Sweden.....	382,108	489,887	526,868	528,000
Spain.....	52,000	148,704	294,118	296,858
Italy.....	6,000	8,842	12,200	12,500
Canada.....	23,100	25,800	88,867	244,976
Japan.....	7,000	15,000	64,000	75,000
Other countries....	40,000	70,000	150,000	200,000

Totals.....18,484,206 27,460,996 40,836,926 40,806,230

Not less remarkable than the recent advance in the production of pig iron has been the progress achieved in the manufacture of steel. Half a century ago the total production of steel was not more than 80,000 tons. The steel industry, like the iron industry, was mainly concentrated in our own country. The Americans were deemed by British steel manufacturers, and to a large extent declared themselves, to be quite unable to produce steel of high quality, and hence for many years they got the greater part of their best steel from Sheffield. To-day the United States alone are producing 170 times as much steel as the whole output of the world in 1850, while the total make of steel in all countries in 1901 was 383 times as much as the world's output in 1850. The details of this marvelous development are set out for four different periods in the details which follow:

Total Output of Steel by Leading Countries, in Metric Tons.

	1880.	1895.	1900.	1901.
United States.....	1,287,983	6,312,074	10,689,640	13,697,154
Germany.....	624,418	2,830,468	6,645,869	6,394,222
Great Britain.....	1,341,690	3,365,109	4,904,232	4,985,778
France.....	388,894	714,523	1,660,118	1,465,071
Belgium.....	132,052	454,619	654,827	731,249
Austria-Hungary....	134,218	330,000	945,200	1,145,654
Russia.....	295,568	574,112	1,830,260	1,762,000
Sweden.....	28,597	197,177	300,536	258,400
Italy.....	?	55,000	104,200	96,000
Spain.....	?	65,000	125,000	120,000

Totals..... 4,233,420 14,898,082 27,859,882 30,655,528

A comparison of these two sets of figures will show that the output of pig iron and steel does not always run on all fours—in other words, that while in 1901 there was a notable reduction in the make of pig iron, the output of steel had largely increased. This shows clearly that the demands of the world to-day are mainly for steel, and that as a structural material steel is rapidly taking the place of other materials. Seeing that we have within six years increased our output of this material by nearly 16,000,000 tons, or 107 per cent., the problem of our advance in the future is one that suggests many interesting reflections. One of the first questions that a steel manufacturer asks himself when putting down a new or extending and modernizing an old plant, is that of how far there is likely to be a market for the increased product. The answer appears to have been more encouraging to the Americans and Germans than to our own countrymen, judging from the enterprise with which they have both considerably more than doubled their product within six years, while we have only permitted ourselves to advance by some 50 per cent. The problem remains to-day the same as in former periods. Will the world consume the vast increase of steel now being arranged for, or will that increase prove the undoing of those whose energy and enterprise have made it possible? If past experience and especially that of the last ten years is of any value, the demands of the future are not likely to slacken. We cannot but think that the figures we have cited supply much encouragement to both ironmasters and steel manufacturers to go ahead.

The National Association of Malleable Iron Manufacturers are holding their regular monthly meeting at the Waldorf-Astoria in this city, as we go to press. The subject of consolidation is one of the matters which will be considered at this meeting, and it is possible that some definite conclusion will be reached.

J. J. Beck, formerly superintendent of the Falcon Works of the American Sheet Steel Company, at Niles, Ohio, has accepted a similar position with the Youngstown Iron Sheet & Tube Company, at Youngstown, Ohio, succeeding William Kent, resigned.

HARDWARE.

If the plans of those who are organizing the consolidation of Axe and Edge Tool interests, together with other concerns manufacturing materials which enter into the goods, are carried into effect there will be given to the trade an opportunity to observe the working out of a great problem on lines which are different in some respects from those of consolidations with which the trade are familiar. The experiment of uniting in one ownership the plants of the manufacturers of such finished products as Axes, Hatchets, Scythes, &c., has frequently been tried, but in this case there is a departure from the usual course in identifying with the company prominent manufacturers of the Handles that become part of the goods, the owners of quarries from which the Grindstones which are used largely in the making of the goods are to be obtained, while steel plants from which material can be procured are also to be merged. The aim is thus in regard to these essential supplies to make the company self-sufficient, and able to meet its requirements from within itself. This, it will be seen, is carrying the spirit of consolidation to a more logical conclusion than has heretofore been at all generally attempted. In this fact lies the chief speculative interest with which the experiment will be regarded. The trade will await with some solicitude advices in regard to the final result of the negotiations, which seem to be in the estimation of those in charge of the project very near a successful consummation.

Even assuming that the International Axe & Tool Company are organized on substantially the lines intended, the trade will be desirous of knowing many things in regard to the plans of the consolidation, not merely in the spirit of curiosity, but from a recognition of the important bearing the company's policy will have on the lines affected, and to a certain extent on trade interests in general. The manner in which the governing board will be constituted, the personalities which will be dominant in its councils, and especially the choice of the individual who will be the head of the great aggregation, are matters of fundamental concern which have direct bearing on the success of the enterprise. While the International Axe & Tool Company is a dignified and appropriate name, indicating very happily the field of the company's operations, with promise of an attempt to cover foreign markets better than ever before, the trade would regret to see disappear from the market the names of its constituent companies and houses, many of which have an honored reputation and have important value as trade-marks. It is not, we believe, formally determined what the policy of the company will be in this regard, and it is to be hoped that it will be feasible to retain to a large extent the individuality of the separate concerns even though they are under common ownership and management. In this way something will be done to avoid arousing the popular antagonism to trusts and consolidations, which must be recognized as a real hindrance in the way of this and similar schemes, with the possibility that somewhere in the future legislative action may interpose additional and troublesome obstacles.

The dangers that lie in the path of a great consolidation which at the outset practically controls the industries with which it has to do, are, however, chiefly from within. If the capitalization of the company represents inflated values, as is the case with many of the consolidations with which the trade are familiar, it does not require the foresight or sagacity of a prophet to

predict disaster in the days to come. In the strife for business even the largest corporation cannot afford to be loaded down with much dead weight, which is sure to be an increasing burden and likely to become too heavy to be carried, and it will thus even from the start be seriously handicapped in the race with nimble footed competitors. This is a danger which in insidious and attractive form assails a consolidation in the formative stage of its existence and which it is very difficult to remedy if the mistake has once been made. When the weakness is inwrought into the structure of the organism it becomes a constitutional infirmity.

Assuming that a consolidation has been effected without extravagant valuations on the plants or unreasonable bonuses to their owners, the new aggregation is liable to fall into grave errors by the adoption of an unwise and shortsighted policy. Many combinations and consolidations which have almost complete control of the market, in the sense that all the important manufacturers are identified with them, are apt to resort to measures to perpetuate their control by endeavoring to prevent the establishment of competing concerns. This, as the trade are aware, has been done repeatedly. It may be that they have tied up manufacturers of certain kinds of machinery essential to the production of the articles in question, or that they have invested the obtaining of some necessary material or supplies with peculiar difficulty. When these efforts fail, as they always do in the long run, resort is had to subsidizing the new concern to keep it out of the market, or purchasing it outright. The adoption of such a policy is almost necessarily accompanied by the establishment of high prices which are sufficient to yield an ample profit after the expensive process of repression has been pursued. A break in prices is only a question of time and then there is usually the effort to drive out of the market competitors who have been fostered into a position not only of strength but of favor with the trade. In the fierce fight that ensues unreasonably low prices are established and a demoralized condition produced, much to the annoyance and injury of the trade and of the line directly affected, the last state of which is worse than the first.

It is intimated by those most active in the formation of the International Axe & Tool Company that it is not the intention to adopt in its management—if existing plans be actually consummated—the policy referred to above, which is contrary to the spirit of the trade and has so frequently proved to be unsound. If reliance for the maintenance of a permanent and even commanding place in the market is based on economies of manufacture and distribution, and the many advantages which are claimed to result from doing things on a large scale, there will be little ground for criticism. There will then be recognition of the rights of competition, which will be expected as a permanent condition in the market, to avoid encouraging which prices will be kept down to a reasonable and comparatively low level, much to the strengthening of the consolidation in its position in the market not only at home, where such methods will meet with favor, but also abroad, as it is prepared to enter and take possession of the markets of the world.

Condition of Trade.

The present state of the market is a curious illustration of conservatism combined with confidence. There is a very general feeling that values are not likely to be higher and that, on the other hand, there is a

strong probability of reductions in some staple lines. This tendency has shown itself already in Sheets, Wire Nails, Barb Wire, Tin Plate and other goods, while other lines which are near the raw material are giving indications of coming concessions. This has the effect of making the trade cautious about their purchases of such goods. At the same time the volume of business keeps up in a remarkable degree, and merchants are making preparations for a good spring business and buying freely in sufficient quantities to cover their needs, which, with the rapidity with which goods are going into consumption, means a large volume of current business. There are some indications that in certain lines the high costs are checking enterprise, but in spite of this a great deal of new work is projected and the great pace which has characterized the trade has kept up wonderfully well. Merchants must not be surprised if there are announcements of lower prices in important lines in which high prices and the prevailing enterprise have stimulated competition, for there is no doubt that any such shrinking in values is to be regarded as a result not of diminished sales, but of increased production. American manufacturers have responded in characteristic fashion to the opportunity to extend their plants or take up the manufacture of altogether new lines, and the result is that the manufacturing output is greatly in excess of what it was before the setting in of the present era of activity. If there can be a return to a lower level of prices without disturbing too much the existing prosperity and confidence in general in the market, it will do much to make the present satisfactory condition continue well into the future.

Chicago.

(By Telegraph.)

Rumors were current in this market on Tuesday last that the negotiations for a consolidation of the Axe and Tool companies had been suspended, and that at least some of the options had expired. This report cannot be verified in Chicago at the present time. On the other hand manufacturers' agents of some kinds of Edged Tools have communicated the fact that higher prices, probably about 10 per cent., are imminent on Chisels, Drawing Knives, Auger Bits and Braces, which has induced considerable purchases for next year, but this report also lacks confirmation. There has continued to be a considerable pushing of Shovels incidental to the decline in prices, which takes place on November 15, but as far as present trading is concerned the lower prices have already been discounted. The ordinary season for Scoops is about over, but jobbers note that the demand is sustained much beyond the usual proportions and time. Jobbers are making quite liberal shipments of holiday goods, including Sleds, Skates, Toys, Pocket Knives, Carvers and other Cutlery. Shipments of the other regular fall lines, such as Lanterns, Axes, Stove Boards, Elbows, &c., have continued on a liberal scale. From some quarter it was reported that a truce was about to be arranged between the belligerent firms manufacturing Strap and T-Hinges, but if so local agents have not been informed of negotiations. Jobbers continue to experience a fair run of orders for Builders' Hardware for immediate consumption, but, as a rule, trade in this line is falling off, and as yet orders for next year are not frequent. Dealers are also holding off from making purchases of Steel goods for spring delivery, but there has continued to be fair buying of Wire Cloth, Poultry Netting, Lawn Mowers, Refrigerators, &c. Manufacturers of Steel Wheelbarrows note a steady increase in the demand for their specialty, and producers of Saws continue to experience a very crowded condition of the various factories. There continues to be a steady, distributive trade in Washing Machines and Wringers. There seems to be a falling off in the demand for Sad Irons, but Enameled Ware, Coffee Mills and

other kitchen utensils continue to meet a fair order inquiry. Stove manufacturers have begun to make liberal purchases of Stove Bolts, and there has been some further satisfactory buying of Blacksmiths' Supplies and a better movement in other lines of Heavy Hardware. There continues to be a liberal distribution of Screws, but the market has shown no disposition to recover from the low prices prevailing. Nails and Wire have continued attractive to jobbers, the low rates prevailing between Chicago and the Missouri River points stimulating ordering by jobbers.

St. Louis.

(By Telegraph.)

The active conditions in the Hardware market are unchanged, and the demand seems to be quite as heavy upon the jobbers as has been the case for some weeks. Observation locally shows an increase in the active building operations in all classes of dwellings, hotels and buildings for general business purposes, and Builders' Hardware is therefore in large and increasing demand. Carpenters' Tools is another item of which large quantities are being sold at this time. Shipments of specialties for holiday trade are on the increase, and the anticipation expressed earlier in the season of the heavy demand for this class of goods is being realized in a most satisfactory manner. Salesmen generally are courting a good amount of inquiry and demand for spring goods, and the movement of such specialties as Refrigerators, Mowers, Poultry Netting, Wire Cloth, &c., is in very fair volume for so early in the season. Collections are said to be generally easy.

Trade Conditions in the South.

From the Representative of a Jobbing House: The trade South is feeling somewhat better than 60 days ago owing to continuance of warm weather. There is a likelihood of more top or late cotton than was earlier expected. The merchants, however, in Southern and Middle Texas are still much depressed owing to depredations of the bowl weevil, which has destroyed one-third of the crop in that section, cotton being the principal product they have to depend on. The corn crop was also more or less a complete failure.

The Hardware jobbers generally are afraid other declines will follow Shovels—i.e., goods controlled by combinations—and are buying staple goods very light.

From the Representative of a Manufacturing Concern: It is very difficult to form a correct estimate of the Hardware trade in the South this season, as conditions are very variable in the different sections, being influenced largely by the condition of the cotton and other crops in the various localities. It now seems to be a fact beyond dispute that the favorable weather conditions during the months of September and October have brought about a very decided change in the estimates of the cotton crop, even the most pessimistic conceding that it will be larger than was anticipated and that trade will be fully up to normal for the remainder of the season. Should the cotton crop amount to 11,000,000 bales, which now seems very probable, and price remain at 8½ cents or higher, which seems equally probable, I believe that the Hardware trade in the cotton States will be unusually large during the months of November, December, January and February and that a large number of dealers will have to duplicate present orders for staple goods. There was a feeling of apparent insecurity and uncertainty during the months of July, August and September as to stability of prices for iron and steel products, and the cotton crop outlook was very gloomy in many sections of the South, but the aspect of affairs has undergone a decided change during the past 30 days and the prospect is now much more favorable.

While Wire Nails, Wire, Light Sheets and Pipe, as well as certain lines of Tools and Implements have for certain reasons shown a weakening in prices, it is pretty well understood that causes outside of regular condi-

tions have brought this about and present market prices for other staples will be fully maintained for some months to come.

I predict that there will be an unusually large demand for Iron, Steel, Wire Nails, Pipe, Agricultural Implements, Steel Goods, &c., in December, January, February and March from dealers who have placed unusually small orders early in the season, when the crop outlook was gloomy and fears were entertained that prices would not be maintained.

I feel confident that the South will have an unusually prosperous season, both in Hardware and in other lines. Collections were very slow up to the latter part of September, but have shown a very decided improvement during the past two weeks. I do not believe there will be any weakening in the price of iron or steel or products which these enter largely into the manufacture of, so long as the present unusual demand and shortage of supply exists.

NOTES ON PRICES.

Wire Nails.—The improved demand continues a feature of the market. While the market in general is regarded as being in better condition than at any time during the past two months, it is understood that some of the outside manufacturers are offering Nails to carload buyers of any class at \$1.85. Quotations are as follows:

Jobbers, carload lots.....	\$1.85
Retailers, carload lots.....	1.90
Retailers, less than carloads.....	2.00

New York.—During the past week the local demand has been somewhat less active, although the movement is in fair volume. Much annoyance is experienced by jobbers in the delay of Nails in transit from mill. Quotations are as follows: Single carloads, \$2.05; small lots from store, \$2.10. The latter price is sometimes slightly shaded.

Chicago, by Telegraph.—The increased demand that has been noted for the past few weeks has extended to independent mills as well as to the largest producers, the low rates of freight prevailing between Chicago and Missouri River points being responsible for the increased buying at this time. But it seems probable that higher rates will prevail after the first of the year. Official quotations remain steady on the basis of \$2 in carload lots and \$2.10 in less than carload lots, mill shipment, Chicago.

St. Louis, by Telegraph.—Wire Nails are in fair demand, with no particular change reported in general conditions by the jobbing trade. In small lots from store \$2.15 is the prevailing quotation.

Pittsburgh.—The situation in Wire Nails shows no material change. Demand is not up to expectations of the manufacturers, but it is said more Nails are moving than before the recent reduction in prices was made. There are reports of some shading, but these have not been verified, the tone of the market being fairly strong. We quote Wire Nails at \$1.85 in carloads and \$1.95 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days. For galvanizing Nails 75 cents per keg extra is charged and for tinning Nails \$1.50 per keg extra.

Cut Nails.—Steel Cut Nails continue difficult to obtain, but are not so scarce as Iron Cut Nails. The market is reported as being firm at the following quotations: \$2.05, base, in carloads, and \$2.10 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—The local demand for Cut Nails continues steady but moderate. The market is firm at the following quotations for carloads and less than carloads:

Carloads on dock.....	\$2.18
Less than carloads on dock.....	2.23
Small lots from store.....	2.30

Chicago, by Telegraph.—There has been some little increase in the demand for both Iron and Steel Cut Nails, and some difficulty still experienced in obtaining supplies

ordered on specified time. The market has remained steady on the basis of \$2.15 in carload lots and \$2.20 to \$2.25 in less than carload lots, Chicago.

St. Louis, by Telegraph.—No change is apparent in the condition of demand for Cut Nails. Small lots from jobbers' stocks bring \$2.30.

Pittsburgh.—There is a fair demand for Cut Nails, but buyers are confining their purchases mostly to immediate requirements. Iron Cut Nails continue to command about 10 cents advance over Steel. We quote Steel Cut Nails as follows: \$2.05, base, in carloads, and \$2.10 in less than carloads, plus freight in Tube Rate Book to point of destination, terms 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The demand is for small lots, and varies in different sections of the country. A portion of the output of the mills is being shipped to fill specifications on old contracts. Trade in this line may be characterized as quiet. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.15	\$2.45
Retailers, carload lots.....	2.20	2.50
Retailers, less than carload lots.....	2.30	2.60

Chicago, by Telegraph.—The West, especially the territory west of the Mississippi River, has continued to send liberal orders, but there has also been an improvement in the demand from the South, the low freight rates now prevailing stimulating the demand. Prices have remained steady, Galvanized selling at \$2.00 in carload lots, and \$2.70 in less than carload lots, while Painted has sold at \$2.30 in carload lots and \$2.40 in less than carload lots, Chicago. There has been a good order demand for Staples, the market remaining steady at \$2.05 in carload lots, and \$2.15 in less than carload lots, Chicago.

St. Louis, by Telegraph.—The demand for Barb Wire the past week continues about on a parity with recent reports, and in the matter of price the recent figures are maintained. Jobbers quote in small lots Painted at \$2.50 and Galvanized at \$2.80.

Pittsburgh.—There is a fair amount of tonnage being placed, but demand cannot be stated to be satisfactory. On old contracts buyers are not specifying as liberally as the mills would desire. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount off for cash in 10 days: Painted, \$2.15; Galvanized, \$2.45, in carloads; less than carload lots, Painted, \$2.20; Galvanized, \$2.50.

Plain Wire.—The demand continues fair, with a firm tone to the market. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.75
Retailers, carloads.....	1.80
Less than carloads.....	1.90

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	Plain.	Add Galv.
6 to 9.....	Base.	\$0.30
10.....	Advance over base.....	\$0.05
11.....	" " " ".....	.10
12 and 12½..	" " " ".....	.15
13.....	" " " ".....	.25
14.....	" " " ".....	.35
15.....	" " " ".....	.45
16.....	" " " ".....	.55
17.....	" " " ".....	.70
18.....	" " " ".....	.85

Chicago, by Telegraph.—The remarks made concerning Wire Nails and Barb Wire apply to Plain Wire, although in a less marked degree. The volume of business has been satisfactory and the market has remained steady with carload lots selling at \$1.90, and less than carload lots at \$2 from store, Galvanized bringing 30 cents extra.

St. Louis, by Telegraph.—The same moderate demand still prevails in the market for Plain Wire, and quotations by the jobbers at this point are unchanged. No. 9 at \$2.10 and Galvanized at \$2.40 in small lots from store.

Pittsburgh.—Demand is only fair, but prices are said to be firmly held. We quote Plain Wire at \$1.75 to \$1.80, base, for Nos. 6 to 9; Galvanized, 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 18.

Shovels and Spades.—The manufacturers of Shovels and Spades are sending out their revised price-lists and discounts, which go into effect 15th inst. The new prices are represented below, the list given being subject to a discount of 40 per cent, to the general trade:

Plain Back Shovels and Spades.

	Per dozen.
First Grade, Polished, size 2.....	\$15.00
Second " " " 2.....	12.50
Third " " " 2.....	10.00
Fourth " " " 2.....	9.00
Each size above 2, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	

Post, Drain and Ditching Spades.

First Grade, Polished, size 14 inches.....	\$19.00
Second " " " ".....	16.50
Third " " " ".....	14.00
Each size above 14 inches, add 50 cents list per dozen.	

Back Strap Scoops, Eastern Pattern.

First Grade, Polished, size 2.....	\$16.50
Second " " " 2.....	14.00
Third " " " 2.....	11.50
Fourth " " " 2.....	10.50
Each size above 2, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	
Half Polished, 30 cents less list per dozen than Polished.	

Back Strap Scoops, Western Pattern.

First Grade, Polished, size 1.....	\$17.50
Second " " " 1.....	15.00
Third " " " 1.....	12.50
Fourth " " " 1.....	11.50
Each size above 1, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	
Half Polished, 30 cents less list per dozen than Polished.	

Back Strap Shovels and Spades.

First Grade, Polished, size 2.....	\$14.00
Second " " " 2.....	11.50
Third " " " 2.....	9.00
Fourth " " " 2.....	8.00
Each size above 2, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	

Back Strap Coal and Coke Shovels.

First Grade, Black, size 1.....	\$15.00
Second " " " 1.....	12.50
Third " " " 1.....	10.00
Fourth " " " 1.....	9.00
Each size above 1, add 50 cents list per dozen.	
Half Polished, advance list 50 cents per dozen over Black.	

Back Strap Furnace Scoops.

Fourth Grade, Black, No. 00, size 8½ x 13.....	\$8.00
" " " 0, " 9 x 14.....	8.00

Hollow Back Shovels and Spades.

First Grade, Polished, size 2.....	\$14.00
Second " " " 2.....	11.50
Third " " " 2.....	9.00
Fourth " " " 2.....	8.00
Each size above 2, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	

Hollow Back Coal and Coke Shovels.

First Grade, Black, size 1.....	\$14.00
Second " " " 1.....	11.50
Third " " " 1.....	9.00
Fourth " " " 1.....	8.00
Each size above 1, add 50 cents list per dozen.	
Half polished, advance list 50 cents per dozen over Black.	

Hollow Back Scoops, Eastern Pattern.

First Grade, Polished, size 2.....	\$14.50
Second " " " 2.....	12.00
Third " " " 2.....	9.50
Fourth " " " 2.....	8.50
Each size above 2, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	
Half Polished, 30 cents less list per dozen than Polished.	

Hollow Back Scoops, Western Pattern.

First Grade, Polished, size 4.....	\$15.50
Second " " " 4.....	13.00
Third " " " 4.....	10.50
Fourth " " " 4.....	9.50
Each size above 4, add 50 cents list per dozen.	
Black, 50 cents less list per dozen than Polished.	
Half Polished, 30 cents less list per dozen than Polished.	

Hollow Back Furnace Scoops.

Fourth Grade, Black, size 9¼ x 14.....	\$8.00
" " " Half Polished, size 9¼ x 14.....	8.20

Telegraph Shovels, Plain Back and Back Strap.

—First grade.—						—Second grade.—	
		Reg.	Extra	Reg.	Extra		
		strap.	long strap.	strap.	long strap.		
6-ft. Handle, Black	.....	\$18.50	\$20.50	\$17.00	\$19.00		
7-ft. " "	.....	20.50	22.50	19.00	21.00		
8-ft. " "	.....	22.50	24.50	21.00	23.00		
Polished, advance list 50 cents per dozen over Black.							

Telegraph Spoons.

First Grade, Black, 6-ft. Handle.....	\$22.00
" " " 7-ft. ".....	22.00
" " " 8-ft. ".....	24.00

In anticipation of the changes announced, the jobbing trade have for the past two weeks been revising their prices, bringing them down to about the level of the new prices. There is thus a decline of from \$1 to \$2 per dozen on the various lines of goods, which the jobbers prefer to stand rather than unload the goods on their customers. The outside manufacturers are also revising prices, so that there is a good deal of irregularity in the quotations issued, some of which are lower than those of the association, notwithstanding the fact that a loss is thus entailed. Some negotiations have been conducted with a view to uniting the independent manufacturers in some way with a view to checking the competition which exists and diminishing, if may be, the demoralization of the market, but apparently with little success.

Wright Shovel Company.—Wright Shovel Company, Anderson, Ind., for whom Arthur G. Sherman is Eastern and export agent, 14 Warren street, New York, announce the following revised prices on their Imperial Shovels and Spades, to go into effect November 15, the list being subject to the regular discount of 40 per cent.:

Imperial Shovels and Spades.

Solid Socket Pattern, Crucible Steel.

	Per dozen.
D Handle, Square Point Shovels, Polished, size 2.....	\$17.00
D " Round " " " 2.....	17.00
Long " Square " " " 2.....	17.00
Long " Round " " " 2.....	17.00
D " Square " Spades, " " 2.....	17.00
Long " Square " " " 2.....	17.00
Long " Irrigating, with step, " " 2.....	19.00

Size 3, add 50 cents list per dozen.

Grafting Spades same as regular pattern.

For Malleable D Heads, add \$2 list per dozen.

Molders' Shovels, regular list.

Post, Drain and Ditching Spades, Polished, size 14 inches.....	\$19.00
" " " " 16 inches.....	19.50
" " " " 18 inches.....	20.00
" " " " 20 inches.....	20.50

Tacks.—Some of the manufacturers of Tacks have recently announced somewhat higher prices on account of the increased cost of material, fuel and wages, but these advances are not regarded as sufficient to cover the increased expense of turning out the goods. There is also a good deal of irregularity in the prices of the different manufacturers and the purchase of Tacks on the most advantageous terms requires a careful scrutiny of the complicated lists and discounts which are connected with the sale of these goods. The volume of business is fair, but not especially heavy. Manufacturers complain of some difficulty in obtaining material.

Cordage.—Orders for Rope continue to be in limited quantities, to supply the immediate requirements of merchants. For industrial requirements and oil well drilling, Manila Rope is in good demand. Manila Rope has eased off ¼ cent per pound in price during the week, and is quoted on the basis of 7-16-inch and larger at 12 to 12½ cents per pound. Sisal Rope, on the same basis, ranges in price according to quality from 9¼ to 10 cents per pound.

Glass.—The shading of regular quotations, to which we referred last week, may result in changes in the National Window Glass Jobbers' Association. A meeting of the Western division of the association was held at Chicago about two weeks ago, at which there were present representatives of the combined Glass manufacturers. Reports from different parts of the country indicated that the jobbers' agreed prices were not being maintained. This meeting was followed by one held in New York last week, which resulted in a failure of the jobbers to come to an agreement to maintain regular quotations. Since that time Glass has been offered in this market as low as 90 and 10 per cent. discount, which represents its cost to jobbers at factory, without freight added. Another meeting is now in progress in Pittsburgh to come to an agreement as to prices. It is reported that at the New York meeting the representatives of the manufacturers gave the jobbers' association 10 days in which to organize a stronger association, one that could be depend

ed upon to carry out its contracts and agreements; and that if this was not done the manufacturers would sell to carload buyers, or dispose of their product in any other manner they might deem best. The result of the Pittsburgh meeting will be awaited with interest, as it appears as if the future of Glass jobbers depended upon the action taken at this meeting.

Oils.—*Linseed Oil.*—Seed, in the Western market, has advanced, and has checked the tendency to shade Oil prices, although it has not had the effect of advancing quotations at this point. Demand for small lots at New York is good, and at this time there is a temporary scarcity of Oil to satisfy requirements. City Raw is quoted, according to quantity, from 46 to 47 cents per gallon. State and Western brands are quoted, on the same basis, from 43 to 44 cents. Only about half of the estimated crop of 30,000,000 bushels of seed is supposed to have arrived in market, and the daily receipts at Western points are being taken at current prices. It appears as if the seed market is being manipulated, and that to this the strength of the seed market is due. Lower prices for Oil are confidently looked for by large buyers.

Spirits Turpentine.—Owing to the prices reached by Turpentine last week, demand since that time has been light. Quotations, according to quantity, are as follows: Southern, 53¼ to 53½ cents; machine made barrels, 54 to 54½ cents per gallon.

THE PROPOSED CONSOLIDATION OF AXE AND TOOL INTERESTS.

THE efforts to consolidate the Axe and Edge Tool interests under the title of the International Axe & Tool Company, to which we referred in our last issue, are being continued, but have not yet been finally concluded. It is proposed to have a capitalization of \$42,000,000, as follows: First mortgage sinking fund 50-year 5 per cent. gold bonds, \$21,000,000; 7 per cent. cumulative preferred stock, \$6,000,000; common stock, \$15,000,000. The plants of the concerns to be acquired are estimated to have a value of about \$26,000,000, and if to this sum is added the estimated profits between the date of appraisal and the date of proposed acquisition and the value of the stock and supplies on hand, a total valuation of \$31,000,000 is obtained. It is estimated by those active in the formation of the consolidation that important economies amounting to at least \$1,000,000 will be effected as the result of the operation of the various plants under one management. In addition to the concerns mentioned in our last issue as having given options on their plants and being parties to the proposed merger, the following are understood to be identified with the movement: I. F. Force Handle Company, New Albany, Ind.; Diamond State Steel Company, Wilmington, Del., and the Carpenter Steel Company, Reading, Pa.

AMONG THE HARDWARE TRADE.

Phelps-Collins Company, Rockton, Ill., have recently remodeled the Shorb Building, with a view to making it a convenient and attractive Hardware emporium. They are now erecting a large warehouse in the rear of the Shorb Building, the dimensions of which will be 25 x 125 feet. They expect to carry a line of Carriages and Wagons in addition to their former Hardware stock. They are putting a dynamo in a grist mill which they own, and will light their new store with electricity, using about 50 16-candle and 50 8-candle incandescents, as well as two arc lamps. The old style of the concern was Phelps & Collins, but W. R. Webber has secured an interest and the style has been changed to the above.

A. D. Fosburg has succeeded W. W. Corkin & Son in the Hardware, Stove, Tinware and Agricultural Implement business in Fulton, S. D.

Boyd & Son, Horton, Kan., recently disposed of their Hardware business to A. Westeen, who has just sold it to F. J. Joss.

CONTENTS.

	PAGE.
The New Doty Punch and Shear. Illustrated.....	1
The Australian Iron Industry.....	1
Germany's Progress in the Manufacture of Pig Iron Since 1880.....	2
The New American Crank Shaper and Motor Driven Lathe. Illustrated.....	4
The Knoth Steel Process.....	5
New Coal Fields in Belgium.....	5
An Automatic Foundry Test for Contraction.....	6
The French Reciprocity Treaty Renewed.....	7
Anti-Friction Bearings. Illustrated.....	8
The Noelke-Richards Iron Works.....	13
Orient Coal & Coke Company.....	13
Modern Mechanical Engineering.....	14
International Exposition at Athens.....	16
English Iron Manufacturers.....	16
The Gardner Motor Driven Grinder. Illustrated.....	16
Coke.....	17
The Hill Crank Turning Attachment. Illustrated.....	18
The Christensen Engineering Company.....	18
Drawback on Pig Iron for Sugar Machinery.....	18
The Philadelphia Foundrymen's Association.....	19
An Austrian Continuous Sheet Mill. Illustrated.....	20
"Official Notices".....	20
The Wharton Automatic Die Head. Illustrated.....	22
The Suppression of Smoke in Steam Plants Using Bituminous Coal.—VI. Illustrated.....	23
Central Pennsylvania News.....	26
South African Trade.....	26
The Fire on the New East River Bridge. Illustrated.....	27
Notes from Great Britain.....	31
Gas Power Development.....	35
Personal.....	35
Editorial:	
Two Advocates of Financial Reform.....	36
Exports of Manufactures Increasing.....	36
Peculiar Chicago Developments.....	37
The Fire on the New East River Bridge.....	38
Manufacturers Supporting the Drawback Bill.....	38
Drawback Decisions.....	39
Obituary.....	39
New Publications.....	40
Condition of the Shipbuilding Industry.....	40
American Bridge Company's Plans.....	41
The Steel Billet Ruling Sustained.....	42
Trade Publications.....	42
More Steel Car Suits.....	42
Manufacturing:	
Iron and Steel.....	43
General Machinery.....	43
Boilers, Engines, &c.....	44
Foundries.....	44
Bridges and Buildings.....	44
Fires.....	44
Hardware.....	44
Miscellaneous.....	45
October Fluctuations in Iron Stocks.....	45
The Iron and Metal Trades:	
Comparison of Prices.....	46
Chicago.....	46
Philadelphia.....	48
Cleveland.....	49
Cincinnati.....	50
Birmingham.....	50
St. Louis.....	51
Pittsburgh.....	51
New York.....	53
Boston Machinery Market.....	53
Metal Market.....	54
The New York Machinery Market.....	54
What is Steel?.....	55
Pig Production Increased.....	56
Iron and Industrial Stocks.....	57
Canadian News.....	57
An English View of the World's Production.....	58
Hardware:	
Condition of Trade.....	59
Trade Conditions in the South.....	60
Notes on Prices.....	61
The Proposed Consolidation of Axe and Tool Interests.....	63
Among the Hardware Trade.....	63
The New Orleans Conventions.....	64
Lancaster Peerless Emery Wheel Company.....	64
Notes on Foreign Trade.....	65
Conditions in South Africa.....	66
Trade in the Philippines.....	67
The Rochester Stamping Company's Catalogue.....	67
James H. Scofield. Portrait.....	67
Hardware Merchants' Mutual Fire Insurance.....	68
Coldwell Lawn Mower Company's Banquet.....	68
The Cleveland Hardware Company's Catalogue.....	68
Hughson & Allen Mercantile Company.....	68
Statement as Basis for Credit. Illustrated.....	69
Manufacturers Routing Shipments.....	69
Trade Items.....	69
A Centennial Celebration.....	70
Giant Grip Horseshoe Company.....	70
Schatt & Morgan Company.....	70
The Kilbourne Mfg. Company.....	70
Requests for Catalogues, &c.....	70
Bindley Hardware Company.....	70
Price-Lists, Circulars, &c.....	71
Miscellaneous Notes:	
New Departure Lubricant.....	72
Solid Cast Steel Hatchets.....	72
Anti-Scorch Roasters and Stove Pans. Illustrated.....	72
Automatic Neck Yoke Center. Illustrated.....	72
Combination Tumbler and Tooth Brush Holder. Illus.....	73
The Cape Bottle Copper No. 83. Illustrated.....	73
New Departure Coaster Brake, 1903 Model. Illustrated.....	73
The Common Sense Flue Stop. Illustrated.....	74
The Wilcox Gear Sets. Illustrated.....	74
The Rubber Neck Horseshoe. Illustrated.....	74
Current Hardware Prices.....	75
Current Metal Prices.....	82

The New Orleans Conventions.

THE eighth annual convention of the National Hardware Association and the third convention of the American Hardware Manufacturers' Association will be held simultaneously on the 19th, 20th and 21st inst. at New Orleans, the headquarters of the two associations and the scene of the conventions being the handsome and capacious New St. Charles Hotel.

Manufacturers' Programme.

The opening session of the Manufacturers' Association will be held on Wednesday afternoon, the morning being occupied by the members at the initial session of the jobbers' association, in which they have been invited to participate. After the President's address and address of welcome by M. J. Sanders, president of the New Orleans Progressive Union, to which Julius C. Birge of the St. Louis Shovel Company will respond, the minutes of the last meeting will be read, followed by the report of the secretary-treasurer of the association. A number of papers will follow on subjects of vital interest. Frank Dickerson of the American Tin Plate Company, New York, will discuss "Trade-marks or Private Brands." "Costs—Factory, Administrative and Distributive," will be the topic of papers by Charles W. Asbury of the Enterprise Mfg. Company, Philadelphia; Geo. W. Corbin of Corbin Cabinet Lock Company, New Britain, Conn., and James P. Kelly of Kelly Axe Mfg. Company, Alexandria, Ind. The session will be brought to a close by a discussion of "Export Trade," by Frank L. Clark of Alabama Tube & Iron Company, Birmingham, Ala., and E. B. Pike of Pike Mfg. Company, Pike Station, N. H. On Thursday morning an executive session will be held and in the evening a joint meeting with the jobbers is on the programme, at which a subject presented by the manufacturers will be discussed. Friday forenoon the closing session will be held, this also being of an executive character.

The Jobbers' Programme.

The initial session of the National Hardware Association will be called to order on Wednesday morning at 9.30. This will be an open session, to which the manufacturers and other visitors are invited. After prayer by the Rev. Davis Sessums, D.D., Hon. Paul Capdevielle, Mayor of New Orleans, will make an address of welcome. Addresses will also be made by Dr. E. A. Alderman, president of Tulane University; T. J. Woodward, president New Orleans Board of Trade; H. G. Hester, secretary of the Cotton Exchange, and J. A. Wogan, president of New Orleans Cotton Exchange. After the reading of the president's annual address and secretary-treasurer's report there will be a colloquy on the subject, "Mutuality of Interest Between Manufacturer and Jobber: By What Means Can This be Best Advanced?" in which prominent manufacturers will participate. The session in the afternoon will be executive in character, when reports of the different committees will be presented. Thursday morning another executive session will be held, and in the evening a joint meeting with the manufacturers will take place. On Friday two executive sessions will be held, morning and afternoon. The convention will be brought to a close at the end of the latter session by the installation of officers, which the manufacturers and other visitors have been invited to witness.

Entertainment.

Elaborate arrangements have been made to entertain the visiting Hardware merchants and manufacturers. The local Entertainment Committee of the National Hardware Association is constituted as follows:

COL. B. F. ESHLEMAN, Strauffer, Eshleman & Co.
T. JAMES FERNLEY, *ex-officio*, Philadelphia, Pa.
A. BALDWIN, JR., A. Baldwin & Co.
R. K. HIRSHMAN, A. Baldwin & Co.
W. R. STAUFFER, Strauffer, Eshleman & Co.
E. J. COPE, Strauffer, Eshleman & Co.
WM. M. PITKIN, A. Baldwin & Co., New Orleans, La.

The official programme of entertainment as determined upon includes a reception in the Palm Garden of the hotel on Wednesday evening by the ladies of

New Orleans, a river excursion and visit to sugar plantation in active operation on Thursday afternoon and banquet on Friday evening. Also on Thursday evening during the joint meetings of the associations the ladies of New Orleans will entertain the visiting ladies at the opera.

A Large Attendance Expected.

All the indications point to an exceptionally large gathering of Hardwaremen and their ladies from all parts of the country in New Orleans next week. Many applications for accommodations are coming in daily, and at the end of the past week there were booked between 250 and 300 jobbers and manufacturers and from 75 to 100 ladies. The hotel accommodations are ample and first class. The New St. Charles, where the conventions will be held, has accommodations for 700 guests, with 150 private bathrooms and 450 parlors and bedrooms. Within two squares of the St. Charles are the Grunewald and several other hotels with excellent accommodations, so that no one need stay away for want of satisfactory hotel quarters.

The New Britain Party.

A distinguished party of New Britain manufacturers, with one or two others, will attend the conventions. The *personnel* of this party is as follows:

P. & F. CORBIN: Charles M. Jarvis, Charles H. Parsons, Charles B. Parsons, Charles Glover, W. E. Bartholomew.
CORBIN CABINET LOCK COMPANY: George W. Corbin, C. H. Baldwin, George Corbin, Jr.
RUSSELL & ERWIN MFG. COMPANY: Howard S. Hart, Benjamin Hawley, Clarence Earl.
STANLEY WORKS: George P. Hart, L. H. Pease, Edward Duncan.
LANDERS, FRARY & CLARK: Charles F. Smith, George M. Landers.
STANLEY RULE & LEVEL COMPANY: Alex. W. Stanley, Robert N. Peck.
HART & COOLEY MFG. COMPANY: Norman P. Cooley.
C. S. MERSICK & CO., NEW HAVEN, CONN.: Colonel Woodruff.
CHARLES PARKER COMPANY, MERIDEN, CONN.: W. H. Lyon.

The programme of the party is to leave New York on Thursday, 13th inst., making a few stops *en route*, not yet determined, except that it is intended to spend Sunday at Lookout Mountain, Chattanooga. They will arrive in New Orleans probably some time Tuesday. The party will have two special cars, which will be handled by the Norfolk & Western Railroad, a representative of the road accompanying the travelers.

George P. Hart of the Stanley Works and Robert N. Peck of the Stanley Rule & Level Company are the committee having charge of the details of the trip.

Chicago Special Train.

From present indications the special train arranged for by the committee in charge leaving Chicago Monday, November 17, for New Orleans will carry about 100 persons. Already between 85 and 90 delegates have made arrangements to make the trip. The special train will consist of three sleeping cars, a combination library and sleeping car, a smoking and buffet car and a dining car. The library and observation car will be reserved for the women guests. The dining car will run through from Chicago and dinner will be served Monday evening. The committee are anxious to provide ample accommodations for all, and suggest that those not already provided for who are desirous of making the trip make immediate application for reservations.

LANCASTER PEERLESS EMERY WHEEL COMPANY.

LANCASTER PEERLESS EMERY WHEEL COMPANY, Lancaster, Pa., are building an addition to their plant in which they will install machinery so as to double their capacity on some sizes of Emery, on which they are far behind their orders. The company advise us that they import all of their raw material direct from the Kardagh Mountains in Turkey, so that their Peerless Mills Emery is absolutely pure Turkish Emery, a consular certificate with official Government seal accompanying each importation made by them.

M. F. Prochaska has opened up in the Shelf and Heavy Hardware business in Lesueur Center, Minn. He expects to build a business block next spring.

NOTES ON FOREIGN TRADE.

BRITISH LETTER.

Office of *The Iron Age*, HASTINGS HOUSE,
NORFOLK ST., LONDON, W. C., NOV. 1, 1902.

The Week's Hardware Market.

THE Hardware and Cutlery trades this week have shown a healthier tone, particularly the Sheffield trades. In Sheffield the manufacturers of Tool Steel, especially of selfhardening qualities, have had a good time and large orders have been received, not only on home account but from America and Germany. There has been a revival in the Spiral Spring trade, and some good orders have been received for Edged Tools, particularly from South Africa. Tools used by plate layers and quarrymen have been largely on order again for South Africa, which has also sent good indents for various descriptions of Saws. At the same time the demand from South Africa, so far as Sheffield is concerned, is less than before the war. The demand is well maintained for Heavy Hammers, Picks, Shovels and Mining and Excavating Tools generally. The Cutlery trade appears to be busy, although orders are badly distributed, some firms being well filled and others working short time. Travelers report the Christmas trade orders are heavier than was anticipated.

The London Ivory sales this week led to heavy business, 86¾ tons being offered. Although 71¼ tons were ivory, the other 15½ tons were composed of sea horse teeth, boar's tusks, rhinoceros' horns and waste. Owing to the plentiful supply of soft Ivory values declined about £1 per hundredweight, but hard ivory, much bought by Sheffield manufacturers, went up from £2 to £3 per hundredweight. Of African ivory there was an extremely small supply, only about 7 tons being offered. Large sound teeth were in good demand at an advance of £2 per hundredweight, and medium teeth also brought enhanced prices. Practically the whole material offered was sold. On the average the Ivory sold for Cutlery purposes showed an advance in price of about 7½ per cent.

In Birmingham and the Midlands also some good orders have been received. Makers are fairly busy in Copper and Brass Tubes again, the demand running chiefly on Wrought Iron Gas Tubes and Steel Tubes for cycle work. In Brass and Copper Tubes not so much is being done in Seamless as in Soldered Tubes for brass founders. Case Tubes for bedsteads, lamp and chandelier makers, have been selling slowly. High conductivity Wire and Tape for electrical purposes show a brisk demand, while Wrought Iron Tubes were firmer, due to a report of an impending amalgamation between Lloyd & Lloyd and Stewart & Menzies. In the Gun trade work is slackening off and complaint is made in the Sporting Gun branch that the Government regulations in "proclaimed" districts in Ireland have adversely affected prospects. Builders' Ironmongery still continues dull, but there have been good orders for Ship Chandlery in the shipbuilding centers, especially in Scotland and Ireland. Wire Fencing is being turned out in large quantities, and the galvanized iron manufacturers are doing a good trade. The cycle season is at an end. On overseas account, trade is steady. A fair volume of indents have come from India and the Colonies, and on South African orders keen competition is felt with Germany and America.

Purchasing Centers in England.

An interesting discussion has recently cropped up as to the character and extent of the two most populous districts in England. As it is always interesting to know where population lies, so that goods may be dispatched there, the following facts dealing with London and Manchester should materially help American exporters. In 1901 there were more than 6,500,000 persons in a 30-mile circle round London, with Charing Cross as the center, and 5,500,000 persons round Manchester, with the Manchester Exchange as the center. If, on the other hand, the circle is extended to 40 miles, then Manchester will contain over 8,000,000 inhabitants, while the London circle remains almost stationary. A 40-mile radius from

the Manchester Exchange includes Liverpool, Leeds, Sheffield, Bradford, Hanley, Stoke, Crewe, Barnsley, Wakefield, Halifax, Huddersfield, Keighley, St. Helens, Oldham, Bury, Wigan, Warrington, Bolton, Blackburn, Burnley, Rochdale, Stockport, Ashton and Macclesfield. It will thus be seen that London, while of enormous population, is after all in a state of remarkable isolation. There is no town of 100,000 inhabitants nearer than Brighton, which is 51 miles, and no town of 200,000 inhabitants nearer than Portsmouth, 69 miles off. To reach a third town of 100,000 inhabitants we must go to Southampton, 77 miles, or Norwich, 108 miles off. It will thus be clear that the district to cultivate is Manchester, in preference to London, although there is surely enough population, both in London and Manchester, to warrant both being cultivated. But Manchester has much better shipping facilities with America. And now comes the announcement of a new regular and direct service of first-class steamers between Boston and Manchester, starting next January. These steamers will sail either weekly or fortnightly, and have a cargo capacity of about 8000 tons. To maintain a fortnightly service three steamers will be required, while for a weekly service five or six would be needed. These increased shipping facilities with the district of Manchester should be carefully noted by American exporters.

Freight Rates to South Africa.

I announced some time ago that the Houston Steamship line would take cargoes to South Africa at 10 shillings a ton less than the conference rates. All sorts of interesting developments are expected in consequence of the determination of many British traders to enter into contracts with the Houston line next year. Several of these firms are bringing an action to recover large sums which, in the form of deferred rebates, lie in the hands of the conference companies. In the terms of the agreement these rebates are confiscated, but in the opinion of many legal authorities such confiscation would be illegal, and a test action will therefore be brought. If the independent traders succeed in their action, it looks as if the rings would be broken up. These rebates undoubtedly are in restraint of trade. For example, a large number of Midland Hardware houses are anxious to secure the better terms offered by the Houston line, but are nervous as to losing the large rebates due to them under their agreements with the Conference lines. Obviously, if some new firm springs up and starts in on the South African trade, they have an enormous advantage on sea freights over the older established concerns who are tied to the shipping rings.

Australian Tariff Troubles.

The well-known firm of Verity's, Limited, write as follows: "Illustrating how arbitrarily the customs authorities are acting under the new tariff, it may be of interest to know that our agent on the other side, whom we have always understood was a highly respectable man, has recently been summoned in the local police court in Sydney for declaring 'engine packing' as 'engine packing,' whereas they state that it should be passed as 'cordage,' which they confidently affirm it is. The result of the summons was a heavy fine, and presumably a caution not to do it again." This is only one of many cases which I have heard of recently.

Trade in the Eastern Mediterranean.

After a few weeks' silence upon the prospects of trade in the Eastern Mediterranean, I again refer to the subject because an opportunity has offered itself whereby a foothold may be obtained in this market in consequence of the decision to open an International Exhibition at Athens in the spring of next year. In connection with this exhibition I quote the following recommendations, and American readers will judge for themselves:

Athens is geographically placed in the very center of the Levant, and the populous countries included in this generic term are in almost daily communication by means of an excellent service of steamboats. A population which cannot be less than 25,000,000 is placed within three days' journey. It is, therefore, not too sanguine an estimate to presume that the exhibition will be visited by many thousands of people interested in commercial and industrial enterprises. No better means

could be adopted for manufacturers to bring their productions well under the notice of the Eastern world.

Athens is peculiarly fitted for an enterprise of this kind. From its geographical position it is central, easily accessible, and possesses a truly beautiful climate, than which there is none finer and more salubrious in Europe. From about the middle of March to June, which is the best time to visit Greece, the sky is cloudless, and the atmosphere free from humidity. Sea and sky present one even surface of a depth of blue which cannot be witnessed in any other part of the world. The quarantine arrangements, which are unusually severe, have of late years warded off epidemics, and apart from the interest of the exhibition, no one will regret spending some time or even the whole of the winter season in Athens.

There are many hotels, of which two are first-class and as comfortable and luxurious as any which can be found in Europe, while the natives themselves are most courteous and friendly to strangers, without being in any way importunate or officious.

Lamps and Stoves in Tunis.

The low price of Petroleum has given a decided impetus to the sale of Lamps and Oil Stoves for cooking and heating purposes in the district of Tunis, and the following information may therefore be interesting to Americans who desire to open up trading connections there:

Metallic Lamps are preferred in Tunis, especially the nickel plated varieties. These are imported mainly from two Austrian manufactories, whose terms are strictly cash. France supplies the costly varieties of Lamps as well as Hanging Lamps in competition with German manufacturers, whose exports, it is said, are tending to diminish. To obtain a footing in the market manufacturers are advised to send Lamps that are cheap and light, and fitted with ordinary burners. Stoves having from one to five burners are very popular, especially in the country districts, by reason of their cheapness and the limited consumption of Petroleum. Petroleum Stoves are beginning to be used for heating purposes, but their price is still too high. A cheap article would, it is said, be assured of success on the market.

The Lock Trade Strike.

With the exception of one or two works where the better class of Locks are made, and a high rate of wages obtained, the whole of the Lock making establishments in the Wolverhampton and Willenhall district are closed owing to the strike which began last Saturday. Both sides at the present moment are equally determined. Three Lock making firms have yielded to the men's demands, but the rest show no immediate disposition to do so. Attempts are being made to bring about arbitration.

Trade Information in India.

The need for more accurate information upon Indian commercial affairs is being felt in India itself, and I hear that the Government of India is considering the advisability in connection with the Department of Finance and Commerce of inaugurating a Bureau of Commercial Intelligence. Various Chambers of Commerce have been asked to co-operate. The Bengal Chamber of Commerce is fearful lest the proposed office should degenerate into mere routine, and suggests that in making arrangements for the new office, an example should be sought in the Philadelphia Bureau of Commercial Intelligence. Bengal has already had constant correspondence with the Philadelphia bureau, and is highly gratified with the result. I advise American manufacturers and exporters not to forget that if this Bureau of Commercial Intelligence becomes an accomplished fact, they should lose no time in obtaining its reports. India is a potential market, capable of almost illimitable expansion.

V. A. de la Cova, 48 Stone street and 81 Pearl street, New York, conducts a general export packing establishment for the trade, having an experience of 15 years in the business. This includes packing in cases and baling dry goods, paper, books, light machinery, Hardware, glass ware, furniture, luggage, &c., principally for the Spanish-American countries—i. e., Mexico, Central and South America and the West Indies. There is also some

packing for European, Australian, Japanese and the Philippine markets. In the main New York commission houses order goods sent there from various sources of supply to be packed in accordance with specific orders, designed to meet the requirements of primitive countries where the cruder forms of transport are employed, such as mule back over mountains, small boats, &c., where small, compact masses must be provided. Large shipments are sent direct from the factories usually, but smaller shipments are often collected and assembled in this way.

CONDITIONS IN SOUTH AFRICA.

TRADE in South Africa shows signs of marked improvement since peace was proclaimed. The following facts were obtained from the representative of a well-known New York house who has just returned from a six months' visit there, in which he covered all the principal commercial centers reached by the Government railroads connecting the various ports with the interior, making the journey from Cape Town, Cape Colony, to Johannesburg, in the Transvaal, two weeks after the declaration of peace. He went over practically the same territory four months later and the only appreciable difference from his point of view was in the Orange River Colony.

Governmental Aid.

As the money appropriated by the British Government for the rehabilitation of the expatriated burghers is being distributed the Boers are going back to their farms, and when the Agricultural Implements purchased by the British Government in the United States are distributed among the poorer and more destitute farmers the effect will undoubtedly be noticed in a few months, as, contrary to the generally accepted idea, there is no lack of gold circulating in the Transvaal and Orange River Colony. Mention is made of the large amount of tarnished gold recently put in circulation, which was buried by the burghers when they went on commando. The next 18 months, it is predicted, will show the biggest trade that country has ever known; no boom, but a steady increase being anticipated.

Traction Engine Innovation.

Up to the present time all traction engines in use out there have been of English make, they being largely used in hauling goods from the docks in Cape Town on heavy flat wheeled trucks to different warehouses and in Johannesburg for the transportation of heavy material among the mines. Now, however, merchants are beginning to look to the United States for their traction engines, three of which of American make that had been shipped to Johannesburg having been landed there cheaper than the English engines and equally efficient.

Erection of Modern Skyscrapers.

As a line on existing conditions and future prospects it may be said a contract has been placed for a 15-story office building in Johannesburg, entirely of steel construction and in every way equal to New York buildings of the same general character. It is being erected by the biggest department store in the place, which will occupy the lower portion and rent the balance for office purposes. The material for its construction, we are advised, is largely Belgian and German, nothing from this country. The dimensions of it, based on a recollection of the site, are approximately 175 feet in depth and a frontage of, say, 100 feet. The finest building at present in the southern hemisphere is said to be the Exploration Building, in Johannesburg, which, however, is only six or seven stories in height.

Progress in Cape Town.

In Cape Town there is almost completed the frame work of a nine-story building of steel construction. The erection of these fine examples of modern structure has been brought about largely by the increased value of the land both in Cape Town and Johannesburg. That entire country shows a tendency toward improvement in the quality of the stuff now bought.

Lost German Prestige.

The Germans, especially in Light or Shelf Hardware, are rapidly losing ground and being superseded by articles of American manufacture. There has developed a strong feeling of antipathy to German goods all over South Africa, which has been brought about in a measure by the action of the German Emperor just prior to the beginning of the war and largely by the atrocious cartooning of Queen Victoria. There is practically a tacit understanding among English merchants in South Africa not to buy German goods if they can get anything to take their place in England or the United States. All importations of German goods are in the hands of German merchants and restricted to that class of trade.

Growing Importance of Durban and Delagoa Bay.

Durban has practically doubled in size since our informant was last there, five years ago, when he spent two years in the country. In his opinion Durban (Natal) and Lorenzo Marquez (Delagoa Bay) are the coming ports, both of which are very good, Durban being the best of the South African seaports. There is some talk of England getting possession of Delagoa Bay by lease or purchase, which, if consummated, will make that port of commanding importance, in view of its nearness to the rich Transvaal country and the further fact that transportation on the Government owned roads of South Africa is based on actual mileage. Delagoa Bay and Port Natal are about the same distance from Johannesburg, and some hundreds of miles nearer than Cape Town, Port Elizabeth or East London. Late European cables estimate that £30,000,000 sterling in Mining Machinery and Supplies will be sent to the Transvaal mines in the next five years.

TRADE IN THE PHILIPPINES.

TRADE between the United States and the Philippines has broadened in scope considerably, although the epidemic of cholera there has restricted commerce to a certain extent. The chief bar to successful trade, according to an important American house who now have a Manila branch, although until the American occupation were only importers of hemp and other products, is the currency question, they being on a silver basis and using largely the Mexican dollar. As soon as the United States Government establish a stable currency, which was attempted last spring by the Washington Government but postponed, business conditions will promptly improve. English, German and other traders are well established, but American merchants are constantly increasing their volume of trade. A fine trade has been done in iron and steel products made in the United States, but the later high prices here have markedly curtailed it, but it will be resumed as concessions in price are made in the future. We are said to be doing a slowly increasing trade in dry goods, some Hardware with comparatively little in canned goods outside of Government supplies. It is the fixed belief of one of our correspondents that just as soon as a stable currency is established that country is going to be a big field for American manufactures, as the natives are taking kindly to American ideas and products.

THE ROCHESTER STAMPING COMPANY'S CATALOGUE.

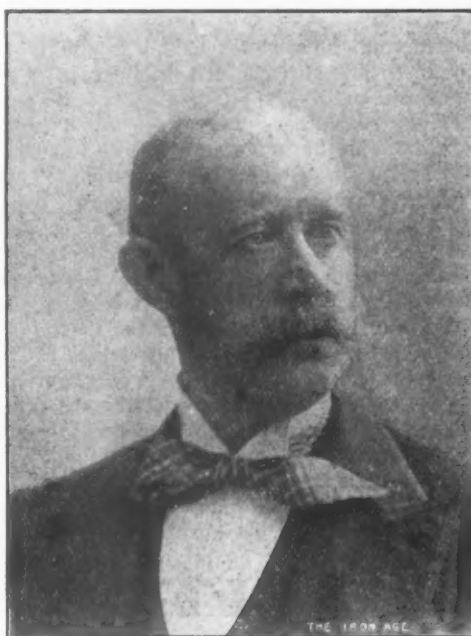
THE ROCHESTER STAMPING COMPANY, Rochester, N. Y., issue catalogues A and B, which are handsomely bound and printed. The former is devoted to their line of Copper, Brass, Tin Plate and Steel Specialties, including Tea and Coffee Pots, Chafing Dish Forks, Soup Ladles, Tea Sets, Serving, Cake, Bread and Fruit Trays; Baking Dishes, Cuspidors, Tea Kettles, Dairy Pails, Hand Sprayers, Wash Boilers, Oil Cans, Galvanized Baskets, Washtubs, &c. The company have largely increased their general line of Copper and Nickel Plated Ware. Catalogue B relates entirely to Chafing Dishes and accessories, of which they are making a large line and have still other patterns under way. The catalogue shows 18 styles of Chafing Dishes,

besides Cutlet Dishes, Toasters, Gas Burners for Chafing Dishes, Spoons, Alcohol Flagons, &c.

JAMES H. SCOFIELD.

JAMES HERVEY SCOFIELD died at his home, 409 Madison street, Brooklyn, Tuesday, November 4, 1902, of heart trouble, from the effects of which he had suffered for the last three months. He was born in Dutchess County, New York, and was in his sixty-third year.

Mr. Scofield came to this city at the age of 20, and was employed by Brown, Harris & Hopkins, 180 Greenwich street, hardware jobbers, who were an outgrowth of the old concern of John C. Tucker, the former house retiring from business in 1873. In the early seventies Mr. Scofield was unexpectedly offered a position of traveling salesman with the Hart Mfg. Company, 243-245 Pearl street, afterward Hart, Bliven & Mead Mfg. Company, the inducement for the change being an immediate increase of salary of from \$600 to \$1200 a year,



JAMES H. SCOFIELD.

and to cover in the main the same territory. About 1875 S. Otis Livingston of the Livingston Nail Company, needing a good salesman, consulted R. K. Carter, then with Hart, Bliven & Mead Mfg. Company, who said he knew just the man, recommending J. H. Scofield, who was thereupon given the position, which he has filled ever since most acceptably for a little over 27 years. Mr. Livingston, his late employer and always loyal friend, said he was the most faithful, upright, high toned, conscientious salesman who ever represented the house on the road, and so far as he could recall no unpleasant word or communication had ever passed between them, adding that he was dignified, gentlemanly and thoroughly honest, a tribute fully confirmed by the many letters received since the announcement of his death from business concerns on whom Mr. Scofield called in various parts of the country.

Mr. Scofield originally visited the trade in New York and Pennsylvania, afterward being transferred to some of the Middle Western States and the Northwest, taking in Pittsburgh, Cleveland, Toledo, Chicago, Milwaukee, Indianapolis, and as far south as Cincinnati and Louisville, together with other cities in adjacent territory.

Mr. Scofield married Miss Lydia Pepper of Brooklyn 33 years ago, who, with four daughters, survives him. He was an attendant at the Greene Avenue Baptist Church, Brooklyn, where his family are also members.

Theo. St. Pierre has purchased the Hardware business of G. C. Bloom in Concordia, Kan.

HARDWARE MERCHANTS' MUTUAL FIRE INSURANCE.

IN a recent issue of *The Iron Age* reference was made to the Hardware Dealers' Mutual Fire Association of Pennsylvania, lately organized and now doing business, with office at Huntingdon, Pa. The subject of insurance, however, is receiving so much attention from Hardware associations that some further particulars as to the plan of the new company may be of interest. The Committee on Insurance appointed by the Pennsylvania Retail Hardware Dealers' Association in arranging for the organization of the company, kept steadily in view two objects: 1, to furnish protection against fire at a low cost, and, 2, to provide that the insurance furnished should be reliable. Cheapness will be arrived at by a specially careful selection of risks, thus reducing the loss by fire, and by doing away with dividends to stockholders, agents' commissions and other unnecessary expenses. It is believed that the ratio of fire loss should run lower in the new company than in the stock companies, but it might be the same or higher and money still be saved for members, as the above items of expense are with the stock companies almost, if not fully, equal to the fire loss.

In considering the question of the reliability of the insurance to be provided the principal causes of failure of insurance companies, especially the old style mutuals, were carefully considered. They were found to be two in number. One is the inflicting of heavy loss upon the company by a single great conflagration. This the Pennsylvania Hardware Dealers' Company avoids by reason of the fact that in the nature of things its risks are greatly scattered and that only a moderate line is taken on any one property. This trouble has occasioned the failure of many companies, both stock and mutual, in the past, and is only avoided by the most judicious underwriting where properties of all classes are taken. The other great cause of failure affects only mutual companies. It is the difficulty and frequently the failure to collect assessments. If a member declines to pay the dues levied against him, suit must be brought on his note, which, even if successful, means a loss of time and money for litigation, and in many cases when judgment is obtained it is worthless. The Hardware Dealers' Company avoids this difficulty by taking a cash deposit in lieu of a premium note; if any one fail to pay an assessment his policy is cancelled and he receives back the deposit, less the amount of the assessment. The great advantage of stock insurance over mutual is that in the former the premiums are collected by the company before the insurance goes into effect and are therefore on hand when losses occur; whereas in the ordinary mutual company the money must be raised after the fire occurs. But under the plan of the Hardware Dealers' Company the collateral deposit being available at any time, pending the collection of assessments, the company have all the advantages of the premium paid in advance and at the same time have the advantages of low expense, no commissions, &c., as above outlined.

That the Retail Hardware Dealers' Mutual Fire Insurance Company of Minnesota, established by the association in that State, are in an exceptionally prosperous condition, is indicated in the following communication under date October 31, addressed to W. H. Tomlinson, president of the State association, by M. S. Mathews, secretary, 323 Boston Block, Minneapolis:

You, gentlemen, at the head of the Retail Hardware Insurance Company, being busy men, hardly realize the rapid growth and marvelous success of this enterprise as shown by our books at the close of the current month. I have the pleasure to report that of the insurance written in the present month only 35 per cent. was renewals, 65 per cent. being new business. No losses have been incurred for several months, our total losses account for the year to date being the trifling sum of \$34.24. Our expense account will also bear mention, for of the total premiums received this year \$17,105.29, that item only shows the amount of \$1,953.22. In other words, the losses and expenses this year are less than 11½ per cent. of premiums received.

To you who have always claimed that a retail Hardware stock was a highly preferred risk, this statement

will be most gratifying. While no man can say what our losses will be it is very safe to predict that with the rapidly increasing business our expenses next year will be not to exceed 10 per cent. of our income.

We are receiving many inquiries as to our methods, development, &c., and with a modest amount of advertising we may expect a still more rapid growth in the coming year.

From a folder just issued by the company we extract the following particulars relative to the business January 1 to October 31, 1902:

Risks written 1902.....	\$737,125.00
Premiums received.....	17,105.29
Losses incurred and paid.....	34.24
Expenses.....	1,953.22
Cash on hand.....	22,739.53
Total amount insurance in force.....	796,475.00

The ratio of expense to premiums received, 1901, was 16 per cent., and for 1902 up to date, as above, 11½ per cent. Losses in Minnesota since the organization of the company have aggregated \$106.41.

COLDWELL LAWN MOWER COMPANY'S BANQUET.

THE COLDWELL LAWN MOWER COMPANY, Newburgh, N. Y., gave a complimentary dinner to their employees and a number of invited guests, at the Palatine Hotel in that city, Wednesday evening, November 5, over 100 persons being present. At 8 o'clock the guests marched into the banquet room to the music of Collins' orchestra. After about two hours spent over the fine menu prepared, the Hon. Howard Thornton, acting as toastmaster, made an address of welcome on behalf of the company, which was appropriately responded to by Charles E. McElrath for the employees. The next speaker was A. D. Clinch of Underhill, Clinch & Co., New York—who in the regular course of trade sell large quantities of Coldwell Mowers—who congratulated the management on the high standard of their product and paid a high tribute to the Coldwells, father and son. Other speakers addressed the gathering, among whom was George A. Sanford, a director of the company. After an entertainment, in which several participated, Thomas Coldwell spoke, briefly acknowledging the flattering remarks that had been made concerning the very satisfactory relations between capital and labor in the company and the interest the management had always taken in its employees. The officers of this concern are Thomas Coldwell, president; H. W. Marshall, vice-president; E. C. Ross, treasurer, and W. H. Coldwell, secretary. Among the directors is the Hon. B. B. Odell, Governor of New York.

THE CLEVELAND HARDWARE COMPANY'S CATALOGUE.

THE CLEVELAND HARDWARE COMPANY, Cleveland, Ohio, issue a complete catalogue, No. 9, of their Steel Rolled Vehicle Hardware. It contains 199 pages, and is divided into three departments: Carriage Hardware, Wagon Hardware, Sleigh Irons and miscellaneous goods. The latter include Dash Channel Steel, Park Seat Steel, Special Steel Shapes, Wrought Iron Shears and Wrought Iron Shear and Punch combined. The catalogue is copiously illustrated, with list prices, descriptions and sizes of the entire line of the company's products.

HUGHSON & ALLEN MERCANTILE COMPANY.

WILLIAM L. HUGHSON of Hughson & Merton, San Francisco and Denver, and of Hughson & Allen Mercantile Company, San Francisco, is at present in this city in connection with a visit to manufacturers in the East with a view to making arrangements with them in regard to their representation in foreign markets through the Hughson & Allen Mercantile Company. In this company associated with Mr. Hughson are Mr. Allen of Morgan & Allen, Geo. W. Emmons and D. C. Henney of San Francisco. The object of the company is the cultivation of export business and for this purpose they will have their main office in Manila, with suboffices in China and Japan.

STATEMENT AS BASIS FOR CREDIT.

WITH the general improvement which is going on in business methods increased attention is being given to the matter of credit. In view of the fact that it cannot be expected that credit will be accorded to a new customer whose responsibility has not been established, it is recognized as reasonable that full information bearing on the matter should be frankly given and in definite and satisfactory form. To facilitate this various forms of signed statements are used, one of which is shown herewith, reduced in size. On the back of the blank the following explanatory matter is printed:

The Value of a Signed Statement.

Good credit enables every merchant to add to his ability to do business. It gives him the use of enlarged capital, thus enabling him to carry a more complete stock and increase his sales.

A merchant's capital is the sum of his net available resources, plus his credit. The giver of credit is a contributor

The following is a true and correct statement of financial condition at this date made to establish a credit with your house; and in consideration of your hereby granting or continuing credit, it is now agreed that in case of failure, insolvency, or the entering up of judgments against the endorser(s), all notes or accounts held by _____ against the undersigned shall there immediately be considered due.

Style of Firm _____
Place of Business _____
Full individual names of partners _____
Length of time in business _____
When did you last take stock? _____

ASSETS.			LIABILITIES.	
	AMOUNT.			AMOUNT.
Stock on hand (net cash value)		Owe for Mfgn. past dcn.		
Notes Receivable (good)		" " " nos. dne.		
Bank Accounts (good)		Bills Payable (notes).		
Cash (on hand or in bank)		Borrowed money due bank.		
Real Estate owned and tenanted hereunder Description:		" " elsewhere.		
		Mortgages on Stock.		
		Description:		
*Homestead (own name)		Mortgages on Real Estate		
Other Assets.		Description:		
Description:				
		Judgments		
TOTAL ASSETS.		TOTAL LIABILITIES.		

Insurance on Stock \$ _____ *Annual Business Expenses \$* _____
Ins. on Real Estate \$ _____ *Sales last year were \$* _____
Are you Endorsor or Security for others? _____

References: { _____

THE ANSWER TO ALL QUESTIONS NOT ANSWERED HEREON IN WRITING IS "NO."

WITNESSES PRESENT: _____ SIGNATURE: _____
Date _____

[7089]

Form of Financial Statement as Basis for Credit (Reduced).

of capital, and becomes, in a certain sense, a partner of the debtor, and, as such, has a perfect right to complete information of the debtor's condition at all times.

It is therefore a fair, reasonable and equitable business proposition that when one man is asking credit of another he should be willing to show what basis he has for the credit asked.

Credit is given a merchant because of the confidence reposed in him. Requesting a statement when credit is asked IS NOT A REFLECTION on one's character, honesty or business ability, but is done to secure reliable information to enable business to be conducted intelligently.

Upon Giving a Statement.

Many a merchant has been saved a loss and his condition greatly improved by friendly advice given as to increase of insurance, the cutting down of surplus stock, or urging collections of large outstanding accounts.

When a statement is made it should be absolutely correct. To make it so necessitates the taking of at least an annual inventory and the keeping of an accurate set of books.

A merchant who desires to serve his own best interests should recognize that his most valuable possession, apart from his actual assets, is a sound, substantial and unques-

tioned reputation as a credit risk, and that, under the prevailing conditions and demands of business, the most effective and eminently the best way to prove his basis for credit is to be willing to submit a statement of his financial condition.

The jobbing house who are using this form of statement advise us that the explanation on the reverse side has tended to remove the objections of merchants to making a statement of this character, and that the form shown has been found satisfactory.

MANUFACTURERS ROUTING SHIPMENTS.

The practice of some manufacturers in insisting on routing their shipments instead of leaving this to be determined by their customers is referred to in the following communication from a well-known Hardware house in Texas:

The only reason that we can see why some manufacturers reserve the privilege of routing their shipments is that they derive some financial benefit thereby. We believe the principle is wrong, and that purchasers should be allowed to route their own shipments. They are more familiar with the quickest route to their point, and frequently have personal grounds for wanting to favor certain roads; aside from the fact that they should not be placed in a position whereby any allowances, rebates, &c., cannot be had, if given at all.

When rates are being cut it gives the dealer living nearest the manufacturing center an advantage over the dealer nearest the trade. His stock is accumulated in his warehouse and can be distributed on a basis of the cut rate, while the other fellow pays the tariff. This is especially applicable to St. Louis, Chicago, Louisville and other large points when applied to Texas trade.

It may be argued that if there is any cutting the buyer gets the benefit. It is felt, however, that the cutting is done, but done secretly, as there is no occasion for the roads to advertise the fact among the dealers that they are unusually eager for business, as they know the dealer has nothing to do with the routing, and they go to the manufacturer, and the retailer will be in ignorance of what's doing so long as the present plan is continued by the shippers. When the routing is left to the shipping clerk with no special instructions, he as a rule takes the line that affords the best facilities in his town, or is governed by personal considerations, and has no regard for the dispatch with which the goods can be handled.

TRADE ITEMS.

THE CHAPIN-STEPHENS COMPANY of Pine Meadow, Conn., and 80 Chambers street, New York, have just started up their mills after having been closed for more than a month. This shut down was absolutely necessary owing to the installation of new machinery. This has delayed the filling of the many orders now on their books, but the works are now running in full blast, and the annoyance caused to their customers by this delay will soon be at an end, and in future, with their largely increased facilities, they will be in a position to fill all orders promptly.

R. W. HUBBARD, who has an extended acquaintance with the trade, has sold his interest in the Crosby Hardware Company, Ashtabula, Ohio, to G. C. and W. B. Hubbard, who will take an active part in the company. R. W. Hubbard represented the old Hardware firm of Pratt & Co., Buffalo, N. Y., for 18 years as traveling salesman. Afterward he was connected with the McIntosh-Huntington Company of Cleveland, Ohio, for six years in the same capacity. In 1894 he organized the Crosby Hardware Company, since which time he has been president and buyer of that company. He leaves the Hardware business to engage in manufacturing.

F. W. BIRD & SON, East Walpole, Mass., manufacturers of Roofings, Special Papers and Paper Boxes, have recently received an order for 1,200,000 square feet of Paroid Roofing for the United States Army Building at Manila. They remark that this is probably the largest single roofing order ever placed, covering over 25 acres

of surface. They issue for free distribution a booklet about economical roofings, which illustrates their extensive manufacturing plant and refers in detail to their product.

EDWARD H. KEATING, who has been in charge of the office of the Yale & Towne Mfg. Company at Pittsburgh, has entered the employ of Joseph Woodwell & Co. in their Builders' Hardware Department. Mr. Keating's many friends will wish him success in this new departure.

LOGAN-GREGG HARDWARE COMPANY, Pittsburgh, Pa., have found it necessary to make another rearrangement of their shipping department in view of the continued increase in their business. It has always been their aim to provide their shipping room with every possible facility for handling a large volume of business without delay, and the changes and improvements which they have recently completed will enable them to carry out this policy with even more satisfaction to the trade than in the past.

THE New York salesrooms at 33 Murray street of Wester Bros., manufacturers and importers of Cutlery, Solingen, Germany, were robbed of a large quantity of Cutlery a short time since. The booty included 400 dozen Pocket Knives, 75 dozen Razors and 60 dozen Scissors, valued at more than \$3000.

A CENTENNIAL CELEBRATION.

ON September 25, 26 and 27 the citizens of Lebanon, Ohio, held a celebration commemorative of the one hundredth anniversary of the founding of the village. The splendid success of the event was largely due to the able management of J. W. Lingo, well known as a Hardware merchant throughout Warren County, who was president of the Executive Committee. For nearly 40 years Mr. Lingo has been in the Hardware, Stove, Agricultural Implement and Vehicle business in the little "City of Cedars." In the conduct of this important celebration he displayed the same fine executive ability that has made him so successful in his own business enterprises. Mr. Lingo personally collected every dollar needed to pay the general expenses of the three days' festivities, and with his enthusiastic zeal and guidance the grandest event in the history of Lebanon was celebrated in a most elaborate, appropriate and fitting manner. Mr. Lingo was especially interested in the industrial and flower parade, which was exceptionally beautiful and original. His own display in this parade was most elaborate. He rode at the head in a runabout gayly decorated with hollyhocks. Behind him was his daughter (who is the able assistant of her father in his business) in a handsomely decorated Stanhope. A superb queen's float followed, this being in the form of an Italian gondola made of thousands of pink and white roses. The next float represented a model dining room and kitchen, a pretty Biddy serving hot biscuits baked on a well-known Range. The last float was an artistic exhibit of winter roses.

GIANT GRIP HORSESHOE COMPANY.

GIANT GRIP HORSESHOE COMPANY, Duluth, Minn., capital, \$120,000, have just installed a complete plant for making an improved Horseshoe and a patent calk. The machinery is new and of the latest patent, driven by electricity and complete in every detail. This product, we are advised, has been successfully tried for the past three years by the lumbering camps, having been made by hand, and the demand has so largely increased that the formation of this company was determined on. We understand that large orders are booked ahead and that the business has flattering prospects. W. R. Brumback, the president and manager of the company, is president of the First National Bank of Wadena, Minn., and is also interested in other enterprises.

C. E. Benson will continue in his own name the Hardware business formerly conducted by Benson & Gustafson at Duluth, Minn.

SCHATT & MORGAN COMPANY.

SCHATT & MORGAN COMPANY, successors to New York Cutlery Company, Gowanda, N. Y., are about to remove their plant from that place to Titusville, Pa. There are several reasons for this change of base, the principal one being the need of more room. Last year the company doubled their capacity, feeling at the time that this would enable them to handle and fill all orders for some time to come, but they find it again necessary to increase their output, and as the plant as enlarged last year covers all the ground owned by the company, and deeming it unwise to run two separate plants, they concluded to look for a location where they could secure ample room and at the same time better their shipping facilities. After careful consideration Titusville has been selected, that city having two railroads, three express companies, natural gas and a large building which they could occupy at once. This building is 54 feet wide by 400 feet in length, and two stories high. The company are now installing new machinery, and expect to take possession of their new quarters about December 10. The new plant will be one of the largest and best equipped Cutlery factories in the country. At Gowanda they are running their plant night and day and hope to fill all orders on time. At Titusville their capacity at the start will be 125 dozen Knives and 25 dozen Razors per day, the capacity being increased as rapidly as possible.

THE KILBOURNE MFG. COMPANY.

THE KILBOURNE MFG. COMPANY have recently moved their entire plant from Fair Haven, Vt., to Troy, N. Y., and are now located in their new quarters at the foot of Cypress street. They have fitted up a fine factory and will have about 40,000 square feet of floor space devoted entirely to the manufacture of their special lines of goods, consisting of Wire Goods for household and stationers' use and Hardware Specialties, including a very large line of Mincing Knives. They also manufacture Metal Shoe Daubers and Polishers, and are now moving the plant of the Vermont Turning & Lumber Company from Bennington to Troy, running it in connection with their business. The power for their plant will consist of a water power, furnishing 100 horse-power, and also a 125 horse-power engine, which can be started up at a moment's notice in case of emergency. The building is steam heated, equipped with automatic fire sprinklers and lighted by electricity throughout, furnished by their own plant.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

William Christensen has closed out his business at Ellensburg, Wash., and has bought the stock and good will of Wiard & Abbey, at Everett, Wash. Mr. Christensen intends to remodel the store and to carry a complete line of Builders' Hardware, Mechanics' Tools, Stoves, Paints, Oils, &c., concerning which he would be pleased to receive catalogues and quotations.

Poindexter-Whitzel Mercantile Company, Kansas City, Mo., are about opening a Hardware and Cutlery department, and will value copies of catalogues and other printed matter.

BINDLEY HARDWARE COMPANY.

AN error crept into the article in regard to the new warehouse to be built by the Bindley Hardware Company, at Pittsburgh, printed in our issue of last week. This new warehouse is to contain 90,000 square feet of floor space on each story, and as there will be four stories, there will be a total of 360,000 square feet instead of 90,000 square feet, as stated.

W. J. Deering is closing out his Hardware stock in Carroll, Iowa, and expects to move to Atlantic, where he is the junior partner in the firm of N. W. Deering & Son, about January 1.

PRICE-LISTS, CIRCULARS, &c.

THE REED MFG. COMPANY, Newark, N. Y.: An attractively printed catalogue of 140 pages illustrating their line of Reed's Patent Anti-Rust Tinware. The company intimate that they carry heavy stocks of goods and are in a position to make prompt deliveries on orders.

THE MARCY MFG. COMPANY, Bluffton, Ind.: Two catalogues, No. 9, relating to their Wind Mill, Tank and special Wind Mill Pump department, and No. 14, showing exclusively their line of Pumps, Cylinders, Fittings, &c.

R. K. BACHMAN & BROTHER, Riegelville, Pa.: Adjustable Window Screens. These are shown in a catalogue in five different styles, one of which, the Automatic, is operated by a spiral spring.

THE OBER MFG. COMPANY, Chagrin Falls, Ohio: Catalogue and price-list illustrating the Ober patent Solid Sad Irons with cold detachable handles, Potts' Handles for all makes of Potts' Sad Irons, Troy Polishing Irons and Troy Sad Irons, both with cold, detachable handles, Nail, Tack and Upholsterers' Hammers, Mauls, Meat Pounders and Ice Picks, Sad Iron Stands, &c.

THE WEAVER MFG. COMPANY, Mt. Holly, N. J.: Leather Goods. A catalogue illustrates Leather Belts, Coin and Bill Cases, Card Cases, Pencil Pockets, Leather Watch Chains, Telescope Cigar Cases and Leather Novelties. All novelties are handsomely carded, one dozen on a card.

LINDSAY & Co., 170 Lake street, Chicago, Ill.: Catalogue No. 1, devoted to Gas Mantles, Burners, Shades, Chimneys, Gas Portables, &c.

THE WADSWORTH-HOWLAND COMPANY, Indiana avenue and Thirteenth street, Chicago, Ill.: Catalogue relating to Paints, Colors, Painters' Supplies, &c. The company have just put on the market an Aluminum Paint, for use on Stoves, Radiators, &c. This is referred to as withstanding heat to a remarkable degree.

THE ORR & LOCKETT HARDWARE COMPANY, 71-73 Randolph street, Chicago, Ill.: Catalogue of Manual Training Equipment and Tools. These include Benches, Lathes, Carpenters' Tools, Grindstones, Glue Heaters, Paint Brushes, Drawing Instruments, &c.

BUTLER BROTHERS, New York: Unabridged catalogue No. 434 for the fall of 1902. The catalogue contains 455 pages of illustrations and net prices, in addition to which there are some pages of valuable hints. holiday goods are shown in this catalogue. The catalogue is the firm's only salesman.

GAAR, SCOTT & Co., Richmond, Ind.: Fifty-third annual catalogue, devoted to Traction Engines, Threshing Machines, Clover Hullers and Circular Saw Mills.

THE SPECIALTY MFG. COMPANY, Indianapolis, Ind.: Illustrated descriptive catalogue of Fans, including Water Disk, Counter and Floor Column Direct Attached and Ceiling Fans, also Water Motors.

THE INDIANAPOLIS BRIDGE & IRON WORKS, J. D. Adams & Co., proprietors, Indianapolis, Ind.: Catalogue No. 3, devoted to Road Machines, Steel Bridges, &c.

THE IDEAL TOOL COMPANY, Indianapolis, Ind.: Catalogue relating to Cement Working Tools, including Tampers, Quarter Rounds, Bevel Tools, Jointers, Trowels, Gutter Tools, Driveway Graders, Name Stamps, Imprint Rollers, &c.

THE PORTER SCREEN MFG. COMPANY, Burlington, Vt.: High Grade Screen Doors and Adjustable Window Screens. A 1903 illustrated catalogue is devoted to these goods, which are shown in a variety of styles.

THE WINKLEY COMPANY, Hartford, Conn.: Catalogue of Oil Hole Covers, Reservoir Oil Cups, Oil Can Fillers, &c.

NEW DEPARTURE MFG. COMPANY, Bristol, Conn., John H. Graham & Co., 113 Chambers street, New York, selling agents: New catalogue of New Departure Bicycle Bells, Coaster Brakes and a general line of Bicycle Sundries. Among the new styles of Bells are one with a continuous alarm, 2 1/4 inch push button model, a 2 1/2 inch plain ratchet chime, the Challis pattern in both wrought and cast gongs, a rotary electric in 1 3/4 and 2 inch gongs

and a 2 1/2 inch double stroke chime. The 1903 model New Departure Coaster Brake is also illustrated and described.

THE BADGER BRASS MFG. COMPANY, Kenosha, Wis.: Cycle and Motor Lamps. An illustrated pamphlet contains advanced description of a few of the 1903 Solar Cycle Lamps and Motor Lamps, which are shown in a variety of patterns.

THE INDIANA STEEL & WIRE COMPANY, Muncie, Ind.: Catalogue and price-list of the Kitzelman Self Regulating Coiled Spring Fencing.

THE HAGGARD & MARCUSSEN COMPANY, 415-419 South Canal street, Chicago, Ill.: Catalogue relating to Swing Chairs, Woven Wire Canvas Cots, Spring Beds, Woven Wire Mattresses and Children's Cribs.

THE MOOSEHEAD MFG. COMPANY, 36 and 38 Bridge street, Brooklyn, N. Y.: Elastic Exercising Apparatus. An illustrated folder shows Exercisers with and without Pulleys, Chest Developers, Massage Exercisers, Wrist Exercisers, &c.

THE CHICAGO WOODEN WARE COMPANY, Twenty-first and Sangamon streets, Chicago, Ill.: Illustrated catalogue of Step and Extension Step Ladders, Painters' Store or Shelf, and Common Long Ladders, Extension Ladders, Painters' Stages, Saw Bucks, Ironing Boards, Bread Boards, Folding Tables, Folding Trestles, Lawn Swings, &c.

THE INDIANAPOLIS BRUSH & BROOM MFG. COMPANY, Indianapolis, Ind.: Circular calling attention to their Capital Metal Case Brooms, made in rattan mixed, bamboo and all rattan. They are designed for use in mills, factories, foundries, stables, railroads, warehouses, packing houses, &c.

BEALL SHOVEL COMPANY, Alton, Ill.: Illustrated catalogue of Miners' Tools and Supplies, including Picks, Handles, Sledges, Wedges, Post Drills, Blasting Tools, Blasting Paper and Fuse, Coke Forks, Riddles, Shovels, Spades, Scoops, Axes, Saws, Files, Lamps, Caps, shoes, &c.

BUTLER BROS., New York, Chicago and St. Louis: Booklet, more than half the pages of which are reduced *fac-simile* reproductions of various pages of their regular catalogue, thus giving an idea of the larger publication, which is issued once a month under the title, "Our Drummer."

THE T. B. LAYCOCK MFG. COMPANY, Indianapolis, Ind.: In the October issue of "Factory News," which is published by the company monthly in the interest of their factory employees, salesmen and customers, prominence is given to the work of the company's baseball team during the season, they having won the local business league championship. A list of September visitors to the plant is also given, together with numerous items of local interest, references to improvements in the factory, &c.

THE HAYES PUMP & PLANTER COMPANY, Galva, Ill.: Drill and Check Row Planters, Listers, Cultivators, Harrows, Hand Carts, Shoveling Boards, Lawn Swings, Hot Water Boilers, Hitching Posts, Pumps, &c. The company have recently put on the market a new Hammock Cultivator, and are now working on another surface cultivator. This will be arranged so that it can be very quickly attached to the Hammock frame, or the beams attached in place of it. It is designed for cultivating corn. If the condition of the ground is such that the surface Cultivator cannot be worked satisfactorily, the regular Shovel beam can be put on so as to make the Cultivator work perfectly with either the Shovel beam or the surface beam.

THE CHICAGO STEEL MFG. COMPANY, Hammond, Ind.: Catalogue illustrating and describing the Rubber Neck Double Cushion Crucible Steel Horseshoe. The company also issue a catalogue relating to the Century Patent Galvanized Steel Posts, Steel Railway, Lawn, Park and Cemetery Fences.

THE NORTH WESTERN SCRAPER COMPANY, Anderson, Ind.: Modern Road Machinery. An illustrated catalogue relates to Reversible Road Machines, Street Sweepers, Wheeled and Drag Scrapers, Plows, Road Rollers, &c.

HEMP & Co., St. Louis, Mo.: Sheet Metal Goods. An attractive catalogue with the cover printed in colors is devoted to Minnow Bucket and Trap, Combination Floating or Sinking Minnow Bucket, Minnow Buckets, Fishing Tackle Cabinet and Boxes, Bait Boxes, Shell Boxes, Camp Stoves, Head Lamps, &c.

THE ROCHESTER SHOW CASE WORKS, Rochester, N. Y.: Catalogue illustrating High Grade Showcases, Store, Office and Bank Fixtures, and Fine Interior Wood Work.

THE ERIE TORSION SPRING COMPANY, Erie, Pa.: Illustrated pamphlet of Torsion Wagon Seat Springs and Torsion Wagon Tongue Springs.

THE PITTSBURGH WOVEN WIRE FENCE COMPANY, Pittsburgh, Pa.: Illustrated catalogue relating to the Pittsburgh Standard Field and Hog Fences.

THE SEAVEY MFG. COMPANY, 120-122 North street, Boston, Mass., American Metal Ware Company, factory at Cambridgeport: Catalogue relating to Deep Stamped, Retinned and Common Stamped Ware; Japanned, Copper, Pieced Tin and Sheet Iron Ware; Hot Air Registers and Ventilators; Tinmen's and Kitchen Furnishing Goods.

THE AMERICAN BELT & FOUNDRY COMPANY, Northville, Mich.: The model Third Folding Buggy Seat. A circular illustrates the device made with iron frame and Brussels seat.

MISCELLANEOUS NOTES.

New Departure Lubricant.

The New Departure Mfg. Company, Bristol, Conn., John H. Graham & Co., 113 Chambers street, New York, selling agents, are putting on the market the New Departure lubricant, made especially for lubricating all kinds of coaster brakes and used by them for that purpose in connection with all their own brakes as sent from the factory. It is a semifluid, viscid substance, resembling somewhat in appearance ordinary vaseline, the melting point of which is 356 degrees F., a temperature not generated by the action of the brake. The object of this preparation is to provide a lubricant that will not melt and run out at a comparatively low temperature. It is said a coaster brake properly packed with this material will last a season without repacking. It is put up in collapsible tubes, $5\frac{1}{2} \times 1$ inch diameter, holding 2 ounces of lubricant and packed one dozen in a box.

Railroad Picks, Mattocks and Grub Hoes.

Beall Bros., Alton, Ill., some time ago put in machinery for making a full line of railroad picks, mattocks and grub hoes, and they are expecting to start up this factory and in a short time will be in a position to execute orders. Their plant is referred to as admirably equipped to turn out the above goods.

Solid Cast Steel Hatchets.

C. E. Peabody, 90 Chambers street, New York, is the Eastern agent for the Central Hardware Company, Philadelphia, Pa., who have just put on the market a new line of solid cast steel hatchets, made both with round and square polls, the particular features of which are the quality and very moderate price.

Anti-Scorch Roasters and Stove Pans.

In Fig. 1 of the accompanying illustrations is shown one of the new Anti-Scorch stove pans manufactured by the National Enameling & Stamping Company, Milwaukee, Wis. These pans are made from refined smooth steel and are claimed to be a great improvement over the old style drip pans. As shown in the cut, the pan has two coppered steel rods running across the bottom from end to end. These rods serve the double purpose of providing ventilation under the pan, which distributes an even heat and prevents burning of the contents, and

also afford protection to the bottom of the pan and serve as a runner in sliding it in and out of the stove. These pans are made in six sizes—namely, 9×14 , 10×12 , 10×15 , 11×16 , 12×17 and 16×17 inches. They are all $2\frac{1}{2}$ inches in depth.

In Fig. 2 is shown one of the company's family roasters and bakers, which are provided with Anti-Scorch

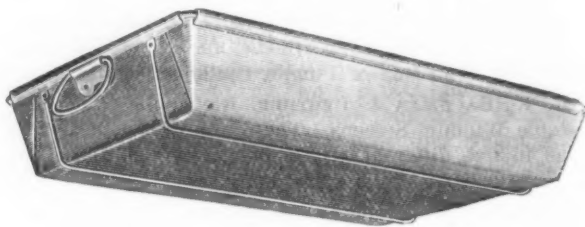


Fig. 1.—Anti-Scorch Stove Pan.

bottoms and ventilators. These roasters are made from refined smooth steel and are equipped with coppered steel rods on the bottom, which gives them the same advantages above outlined in connection with the company's stove pans. They are made, with or without racks, in three sizes, $9 \times 13 \times 6\frac{1}{2}$, $10\frac{1}{2} \times 15\frac{1}{4} \times 6\frac{1}{2}$ and

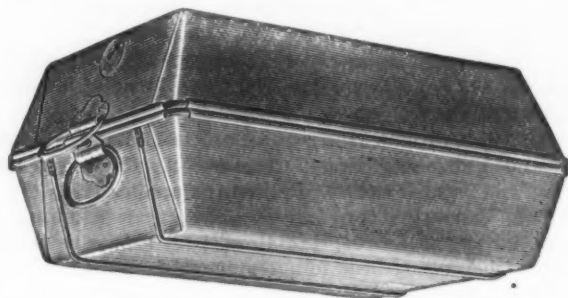
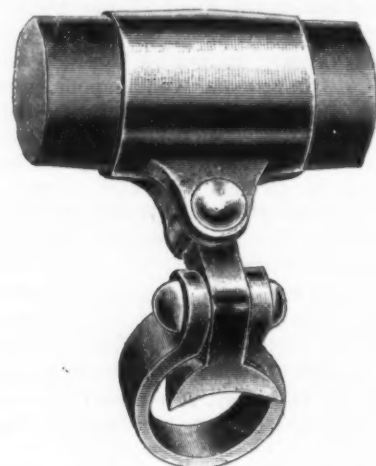


Fig. 2.—Anti-Scorch Family Roaster and Baker.

$14 \times 17\frac{1}{4} \times 7$ inches. The company state that in future all their family roasters and bakers will be made in the above manner only.

Automatic Neck Yoke Center.

The Automatic Yoke Company, Indianapolis, Ind., are offering the automatic neck yoke center shown herewith. It is sold to the hardware and saddlery trade to replace broken leather centers. It can be placed on a yoke by an inexperienced hand by simply riveting the

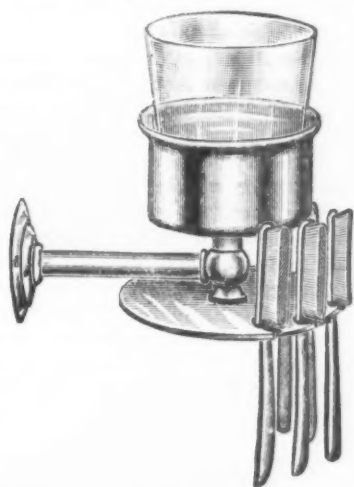


Automatic Neck Yoke Center.

band. The goods are neatly packed in boxes of one dozen each. The concern also manufacture singletrees, doubletrees, patent tripletees and patent combined four, three, two and one horse eveners. The latter are referred to as having been just placed on the market.

Combination Tumbler and Tooth Brush Holder.

J. L. Oefinger & Co., Chicago, Ill., have brought out the combination tumbler and tooth brush holder shown herewith. It is nickel plated, and is attached to the wall

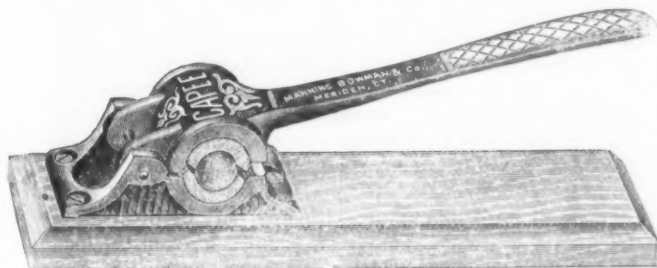


A Combination Tumbler and Tooth Brush Holder.

by screws. The firm also manufacture towel bars of brass tube, with brass flanges for attaching to the wall, the whole finished in nickel plate.

The Capee Bottle Capper No. 83.

The accompanying cut represents a simple, quick and convenient device for capping or forming tinfoil around the tops of bottles. It is operated by holding the bottle



The Capee Bottle Capper No. 83.

in the left hand in a horizontal position and applying the pressure with the right hand. The capper is offered by Manning, Bowman & Co., Meriden, Conn.

New Departure Coaster Brake, 1903 Model.

The New Departure Mfg. Company, Bristol, Conn., John H. Graham & Co., 113 Chambers street, New York, selling agents, have just brought out the 1903 model New Departure coaster brake, here shown, which has

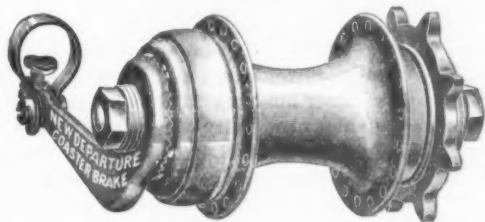


Fig. 1.—New Departure Coaster Brake, 1903 Model.

some marked structural changes as well as an altered outward appearance. It is made in two patterns, regular and special, the former with 1 $\frac{1}{8}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$ and 1 $\frac{7}{8}$ inch chain line, and 4 $\frac{1}{4}$ inches long over all, and the special in 1 $\frac{1}{8}$, 1 $\frac{1}{2}$ and 1 $\frac{3}{4}$ inch chain line, 4 1-10 inches long over all, the sprockets ranging from 7 to 12 teeth in-

clusive and $\frac{1}{8}$, 3-16 and $\frac{1}{4}$ inch thick. Fig. 1 shows the coaster and brake complete, Fig. 2 being a sectional view illustrating the working parts. The present construction embodies the principles of the older patterns, but the arrangement of parts and application of mechanical principles have been modified on lines suggested by ex-

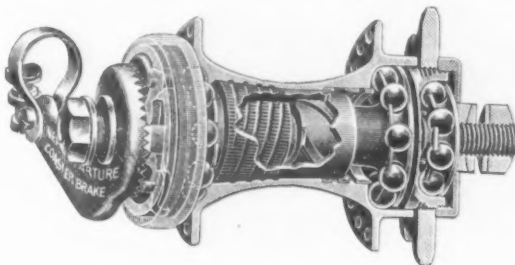


Fig. 2.—Sectional View of Brake.

perience in manufacture and use. The hub barrel, Fig. 3, has a ball cup at each end and a brake drum, all formed from one solid piece of steel. The axle, Fig. 5, is a straight rod with screw threads at each end, all the interior working parts being held in position and adjusted by a turn of the adjusting cone at one end. The part to which the sprocket is attached projects within

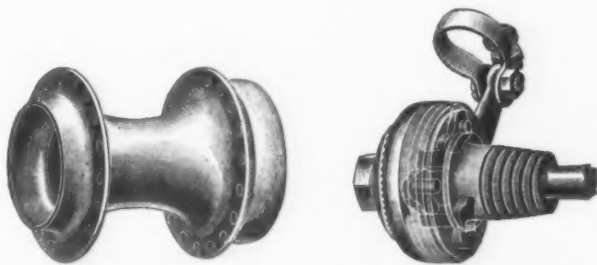


Fig. 3.—Hub Barrel.

Fig. 4.—Brake and Actuator.

the hub and operates the clutch, Fig. 7, a slight backward movement expanding the brake rings in drum of hub and retarding the bicycle in proportion to the back pressure exerted. The clutch in operation with the sprocket and driver is provided with an internal clutching surface which engages with the brake upon backward movement of the pedals; a forward movement causes the outer clutching surface to engage the hub barrel and propel the wheel. The brake and actuator,



Fig. 5.—Axle and Adjusting Cone.

Fig. 4, is operated by the clutch. The brake as now made is composed of three split rings, which are expanded into frictional contact with the brake drum. The parts are of hardened steel and strong enough, it is said, to make them practically indestructible. By the aid of detachable sprockets provision is made for fitting reg-



Fig. 6.—Sprocket and Driver.

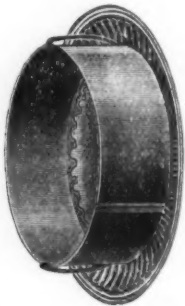
Fig. 7.—Clutch.

Fig. 8.—Adjusting Screw and Arm.

ular hubs with any of the four chain lines referred to and the special hub with three chain lines. Thus with an assortment of sprockets on hand, unsalable sizes being returnable, customers can be accommodated and the dealer carry only a limited stock of hubs. Fig. 8 shows an improvement in the form of an adjusting screw at the end of the brake arm, which provides a convenient way for taking up any slack in frame clip and insuring a rigid attachment to any size of frame.

The Common Sense Flue Stop.

The accompanying cut represents a flue stop offered by J. K. Schick, Fairbury, Ill. The stop is alluded to as



The Common Sense Flue Stop.

being absolutely soot proof, and is simple in construction, durable and easily adjusted.

The Wilcox Gear Sets.

The D. Wilcox Mfg. Company, Mechanicsburg, Pa., are offering gear sets shown in the accompanying illustrations. The sectional view given in Fig. 1 represents their No. 10½ Derby, short bottom, 1901 gear, single

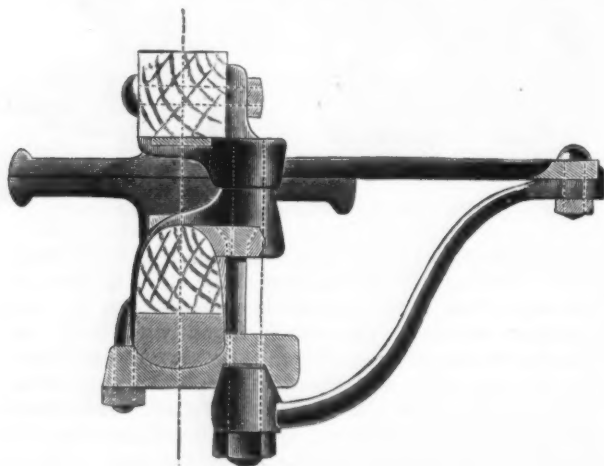


Fig. 1.—Cross Section View of Gear Set.

perch set and single brace. Fig. 2 is a Brewster 1901 set, No. 93 B. B. circles with No. 11 L. head, block plate for mortised reaches. All of the company's 1901 and 1902 gear sets are constructed with their patented socket clip rear king bolt. It is stated that by its use annoyance of broken stems, loose nuts and broken paint on the spring are obviated. It is explained that it is



Fig. 2.—Brewster 1901 Gear Set.

difficult to distinguish the difference between this rear king bolt and the regular center king bolt. This one is clipped neatly over the axle, where it sockets into the head block plate, the bolt passing through the two at the rear of the axle, thence down and through the yoke and brace underneath the axle. The tapered head of the brace is held in its place in a tapered recess in the yoke underneath by the king bolt nut. It is remarked

that all wear is taken up by the turning of a nut, thus avoiding any tendency to rattle, and that not a part turns on a nut. The company make a large line of 1901 and 1902 gear sets.

The Rubber Neck Horseshoe.

The Chicago Steel Mfg. Company, Hammond, Ind., are offering the trade the horseshoe shown in Fig. 1. As illustrated in Fig. 2, the shoe, which is shown bottom side up in both cuts, is made up of four separate parts: the hoof plate, the steel wearing surface, the inner cushion and the cushion wearing surface. Each of these parts is distinct in itself, the whole going together in a way to make the complete shoe practically one piece. The steel hoof plate is made of cold rolled crucible steel, cut and formed cold. Flanges hold the inner pad and the wearing surface in place. It is pointed out that the outer rim of the steel wearing surface is of uniform thickness; also that as the shoe strikes the surface of the street or road this sharp outer edge immediately



Fig. 1.—The Rubber Neck Horseshoe.

takes effect and holds the foot in position, stopping all chances of the foot slipping and sliding about to find a secure resting place before the weight of the horse can be thrown upon it. The inner cushion is made of selected Para rubber, and is placed between the wearing surface and the upper steel plate. It is explained that this inner cushion is responsive to every stroke of the hoof on the ground, that there is no angle at which the hoof can possibly strike that will in any way detract from its effectiveness. It is also said that let a road, be ever so hard or cut up with any sort of projections the shoe will always remove all poundings from the legs. The cushion wearing surface is a composition of Para rubber and sea island cotton, making it lively, tough

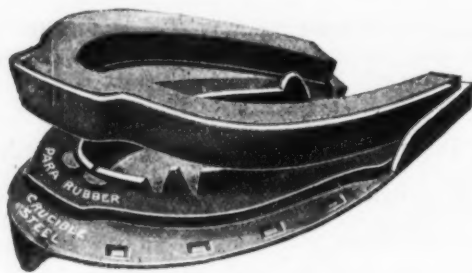


Fig. 2.—Detailed View of Horseshoe.

and long wearing. This, it is claimed, forms a surface that will never slip or yield, and adds largely to the effectiveness of the inner cushion. The point is made that as the surface cushion gradually wears away from constant contact with the ground, so also does the outer rim of the steel wearing surface, making the shoe just as effective when it is almost entirely worn away as when new. The plate that holds the nails never comes in contact with the ground or either of the cushions. The shoe is fitted cold, and the heel can be widened or contracted by the blacksmith, to prevent any portion of the shoe resting directly on the frog; while the nail holes permit the nails to be driven at any desired angle. The manufacturers claim that the shoe prevents all jarring of the hoof and leg, that it balances perfectly, that it does not heat the foot, that it stays on, that it lasts and that it saves money.